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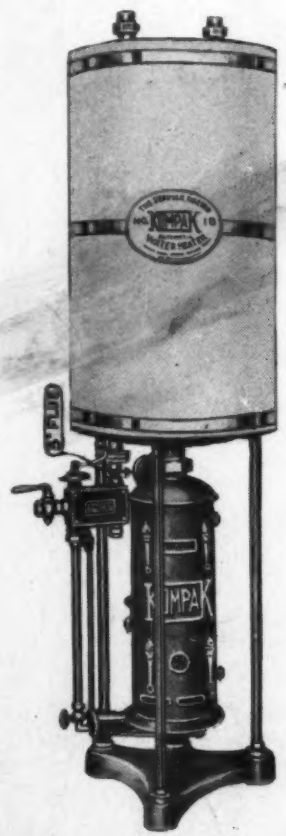

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Seeking a Solution of the Problem on Which Its Existence Depends the Gas Industry Turns to Consideration of the By-Product Coke Oven

Industry Must Again Be Made Attractive to Capital—Experience Has Shown Increased Rates Cannot Be Depended Upon to Provide the Attraction—Financial Engineering Factors Controlling Operation of By-Product Coke Oven Primarily as a Source of Commercial Gas*

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Gas companies have, in common with other public utilities, suffered an abnormal increase in operating costs during the war period. This applies particularly to companies using the water gas process wherein the principal increase in manufacturing expense has been due to the rise in cost of oil to those companies which have not been protected by long term contracts for this commodity.

Recession of Present Price Levels Improbable

The costs of gas and steam coal have also shown heavy increases, and while the burden of these is not relatively as heavy as that brought about by increases in oil prices, it has a greater aspect of permanency. This is due to the higher wage scales prevailing in mining operations and to the fact that levels of wages once established are slow to change. Approximately 70 to 80 per cent of the cost of coal at the mine represents labor charges, and this, supplemented by higher freight rates resulting from increased operating costs of railroads, indicates little prospect of relief in this quarter. On the other hand, it is possible that the great activity in oil enterprises may result in a gradual cheapening of this product to the gas company, unless the expected increased production is absorbed by new and extended demands for it, the effect of which would be to support higher price levels.

The demands of operating labor at the gas plants for increased wages have of necessity been met in order to maintain working forces in competition with war and other industries paying abnormally high wage rates. These, with the right of adjusting prices in accordance with production costs have had an inherent advantage over the public service company in the labor market so that the utility has had the undesirable choice, in many cases, of either paying wages beyond the earning power of its business or of effecting a compensating reduction in the quality of its service or product, to which course of action there are obvious limits.

It therefore appears allowable to state, as a general proposition, that an appreciation of economic conditions responsible for present high operating costs of gas companies supports the conclusion that no adequate relief can reasonably be expected through a recession in labor and material price levels for several years to come. In fact, the labor situation throughout the country brought about by war-time inflation of production and wages, and the labor shortage due to curtailment of immigration during the past six years indicates it is not unreasonable to expect a rising wage rate to meet an accelerating demand for products of all lines of industry. The accumulation of liquid capital during the war period must find an outlet in peace time enterprises of which there are a great number awaiting settled conditions of peace for development. There is a tremendous amount of deferred maintenance to be taken up in all classes of public utility and industrial properties, much of which has been delayed through hope of decline in price levels. New housing construction and work on municipal and State developments will make important additional demands on the national capacity to produce. Bearing these practical conditions in mind it indeed be-

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comes a question as to whether or not the price peak has been passed.

These considerations, coupled with the difficulty of establishing and maintaining higher rates, particularly with respect to properties serving large urban districts, and which may be in any event but a partial measure of relief due to decreased consumption frequently the result thereof and to encroachments of electric lighting and domestic appliances on the gas business, give rather a discouraging prospect to the gas company, as a profitable investment enterprise, under present methods of gas production.

The By-Product Coke Oven as a Possible Remedy

Lacking permanent and adequate measures of relief through such sources, many gas companies have turned to considering the financial and operating feasibility of the by-product coke oven plant as a source of gas suitable for general public consumption. In cases where gas requirements of one company are not large enough to justify construction of a by-product plant to serve it solely, the feasibility of a central plant to supply several distributing companies then becomes the natural alternative for consideration.

The problem is one of broad public interest, not only from the standpoint of conservation of natural resources and development of sources for recovery of valuable by-products, but also as to providing a cheaper and reliable substitute for coal and water gas as now produced. Assuming conditions, later referred to, are such as to favor this adaptation of the by-product plant the financial and economic advantages accruing to the public as well as to the gas company from a more extended use of the by-product type gas, are such as to demand attentive consideration by the industry at large, of this channel of relief from present and prospective difficulties.

The purpose of this presentation of the subject is to set forth certain basic and controlling financial engineering and economic questions related thereto, the proper solution of which will indicate the probable financial results from use of a by-product plant in any given situation and govern the decision as to its commercial feasibility. What follows herein is based upon extensive investigations dealing mainly with the dollars and cents side of the question, which were planned and executed by the writer for specific situations. The subject as here presented is intended primarily as a guide to the interested gas distributing company in establishing a reliable measure of possibilities in applying the coke oven plant to the conditions under which it operates.

It is not proposed to discuss the structural features of suitable types of by-product plants nor the technical and scientific questions connected with the operation thereof. These may be properly and safely left for detailed consideration after the major problem centering about financial results has been analyzed and conclusions reached as to general commercial adaptability.

The investigations leading up to the development of final conclusions may be divided into the following main departments:

Analysis of Past Operation as a Basis for Estimating Future Results

As the ultimate measure of commercial worth will rest upon comparative financial results to be expected operating with the existing type of gas and with by-product gas, respectively, the first step in a study of this kind will naturally embrace a thorough analysis of the results from past operation of the distributing company with gas as now produced. This should cover a period of at least five years, but need not exceed ten years, as in any case this is sufficient to establish the trend of unit operating costs in detail, and rate of growth of business by classes, upon which competition of electric lighting will have an important bearing.

The main purpose of such analyses is to establish a sound and conservative basis for estimating future demand for gas in territory served over a period of years with probable annual, monthly and maximum daily variations thereof. Forecasts of these should take account of six different characteristics of the distributing company operation: (1), actual past rate of increase of gas volumes sold or otherwise accounted for; (2), distribution line losses; (3), past variations in density of population, consumers and gas sales per mile of main; (4), gas sales per consumer, by classes, and per capita; (5), past growth of distribution system and number of consumers, and (6), growth of tributary population, by districts. With these as a basis, the financial-operating characteristics of the property and its territory may be developed. Typical examples of these taken from an actual case are given in Table 1 as a partial illustration of operating characteristics which it is usually advisable to establish. These may be properly applied as a safe and reasonable foundation for estimating basic physical data for the selected future period. With these defined, reliable estimates of future financial results from continuing to operate with the present manufacturing process, may be developed into detailed and summary comparisons for the different plans of operation.

For example, the study of past operation of the gas company should be so laid out as to develop, by years, information of the following character, assuming the water gas process is used:

I.—Manufacturing Operations.

(a) Physical performances: Oil, gas and steam coal consumption, other materials; total and unit quantities per 1,000 cu. ft.; by years, maximum month and average month. Quality of oil and coals as to heat content, chemical and physical analysis.

(b) Cost of gasification materials: Unit prices by years, present contracts and periods yet to run.

(c) Operating labor: Shifts, number of employees by classes, past and present wage scales. Standby and variable labor costs, total and per unit of capacity and output.

(d) Analysis of operating methods to develop possible improvements.

(e) Maintenance: Analysis labor and material costs applying to various equipment accounts, total and per unit of variation. Deferred maintenance.

(f) Miscellaneous: Analysis as between labor and material and character of expense.

(g) Superintendence and clerical: Classification and costs, total and per unit of capacity and output.

(h) Output: Annual, maximum and minimum month. Maximum day. Heat content, total and effective B.t.u. chemical analysis, physical characteristics.

(i) Residuals from existing process: Quantity and value.

(j) Physical plant: New and depreciated values. Determination of fixed charges thereon including amortization as at present provided for in company's accounts and adjustments thereof. Maximum 24-hour capacity. Adequacy and future additions if present process be continued.

(k) Graphical plots of foregoing by years for selected past operating period.

II.—Distribution.

(a) Gas storage: Location and capacity of holders. Adequacy and probable future additions. Cost of operation and maintenance per unit capacity and per 1,000 cu. ft. output and sold.

(b) Pumping: Equipment capacities. Pressures. Operation and maintenance. Total per 1,000 cu. ft. output and sold.

(c) Distribution mains and laterals: Lengths, by sizes. Storage capacity of lines. Cost of operation and maintenance, labor and material, total, per mile, per consumer and per 1,000 cu. ft. sold. Distribution losses, quantity and cost.

(d) Consumers: Classification and number by years. Operation and maintenance services, meters and appliances, total and per consumer. Density of consumers per mile of main, by districts and average for system. Variation thereof by years.

III.—General and Miscellaneous Expenses.

Classification and analysis as between expenses of variable and non-variable character. Per cent of gross, per consumer (billing, collection, etc.).

IV.—Summary of Operating Expenses.

By Accounts: Total, per 1,000 cu. ft., per cent of gross, etc.

V.—Operating Revenues.

Classification and analysis by years: Total and by districts, if obtainable, per 1,000 cu. ft., per mile of main, per capita, per consumer, per street lamp. Merchandise and jobbing revenues.

VI.—Rates.

By classes of service: Franchise provisions, schedules. Past increases or decreases. Prospective revisions.

VII.—Gas Accounted for.

Classification and analysis by years: Gas sales, total and by districts, per consumer, per mile of main. Free gas. Diversity of demand as between holders, districts or towns, where the territory at present or to be served embraces several consuming centers of population.

VIII.—Characteristics of Territory.

As an indication of general worth of territory served with respect to additional development and future growth, study should be made of past increases in population, industries, railroad and banking facilities and earnings of other public utilities.

It is usually advisable to work out future estimates based on the above outlined analysis of past operations for the gas company's entire system and operations. While operating costs and fixed charges other than those applying to gas production would not be affected by a change in type of gas sold, it is desirable for new financing purposes in placing the project before the banker, to develop and show in the final summaries complete financial statements embracing all departments of company operations based on the use of each type of gas.

Future Operation with By-Product Gas

This department of the investigation will deal principally with subjects of a commercial engineering nature, of which a condensed summary is given below:

(1) General suitability of the gas and adaptability to service requirements of distributing company or companies if there be more than one includable in the project economically.

(2) Wholesale gas demands, by companies, annual, maximum and minimum. Diversity between maxima of consuming centers of population. Maximum and average demand of combined territorial consumptions.

(3) Consideration of commercial possibilities in supplying by-product gas for use under all or part of steam boilers in public utility central stations operating in gas company's territory.

(4) Character and quantity of by-products commercially recoverable from a by-product plant, the operation of which must necessarily be governed largely by the volume and quality of gas to be produced.

(5) Market and prevailing market prices of by-products recoverable in accordance with (4). Survey of local market, extent and stability of demand. Competition.

(6) Past production of such by-products, past variation of prices and future price levels.

(7) Cost of construction of by-product coke oven plant of capacity adequate to supply gas demand economically.

(8) Estimated gross costs of operation with plant operated to produce necessary quantity and quality of gas.

(9) Net cost of gas produced after credits for sale of by-products at price levels within the probable range to be encountered.

(10) Rates for supply of wholesale gas to distributing companies.

(11) Comparative financial results.

Following is an outline of the principal factors to be considered in developing conclusions from the line of logical investigation above laid down:

Suitability

The chemical and physical characteristics of by-product coke oven gas obtainable with commercially available coals in a given situation must be such, basically, as will adequately meet the requirements of the local consuming public, and conform to franchise specifications, or those laid down by regulatory bodies exercising jurisdiction in these premises. While it may be stated as a generality that by-product gas is of a type which can be made to meet the necessities of the public, as evidenced by actual use in a considerable number of important American cities, the subject calls for a specific investigation in each case.

Gas Demands—Distributing Companies

For comparative purposes, the gas demands established for future operation with water gas for the individual distributing company or companies may be used for determining the composite gas demand on the by-product plant. This, where more than one gas company is to be supplied, will naturally operate under a better load factor than the individual companies due to the diversity between their maxima, and plant capacity to be provided may be theoretically affected thereby. Due, however, to the practical necessity of providing oven units of correlated number and capacity required for the best overall operating program, it is quite probable that excess capacity to be provided for spares and for immediate future growth, will outweigh the effect of "diversity" in laying out plant unit capacities. The question should, however, be studied with a view of establishing gross annual and monthly variations of gas requirements to be met, as well as maximum, minimum and average daily demands. These will naturally have an important bearing upon the by-product operating program, and upon the question of central storage capacity adequate to absorb fluctuations in daily production and consumption, as well as upon capacities of transmission lines between by-product plant and receiving points of distributing companies. Consideration should also be given to the possibility of using gas producers as an adjunt to the coke oven plant where the demand for its gas increases at a faster rate than for its coke. Increased gas capacity may thus be secured without installation of additional ovens.

Vital Importance of Market for By-Product Bulk Commodities

The by-product coke oven plant operated by distributing companies primarily as a source of gas supply will not as a general practice, at least in its initial operating period, attempt to embark upon extensive fractionation processes. It will probably and advisedly confine its operations to the production of the principal bulk commodities of coke, ammonium sulphate and tar of grades, and qualities essential to supply the demand at prevailing market prices. Consideration of the question of engaging in special fractionations requiring additional equipment and skilled operation of high technical order, may be safely left to later development as specific opportunities therefore are presented.

As will be appreciated, the controlling factor determining the worth of the by-product plant to the distributing gas company as a commercial proposition is its ability to dispose of the coke, sulphate and tar output at prices sufficient to lower the net cost of gas to a point that will make its use profitable. The obtainable price and market for coke, the principal by-product as to bulk, is the most important single factor to consider, a difference of $1 per ton in this meaning a difference of about 10 to 13 cents per 1,000 cu. ft. in net cost of gas depending upon the recovery ratio.

The importance of the coke disposal question requires that an actual survey of the local coke market be made, and also of the competition offered by importations of coke from producing centers. This survey should include determination of average tonnage requirements of all coke consuming industries within a radius of, say, 25 miles, and of large users outside of such territory offering a possible market. The geographical limits of the available market will depend largely upon its location with respect to other points of coke supply offering competition and freight rates therefrom to points of local demand. Past and present prices paid by local coke users should also be established for comparison with ranges of Connellsville base prices for furnace and foundry coke. Possibilities for developing a more extended use of coke for domestic purposes should be given careful consideration in view of prevailing coal costs, and the likelihood that these are on a permanently high level. The diversity and extent of the uses for tar and ammonium sulphate is such that there should be little trouble in disposing of these commodities at suitable prices.

Costs of Construction and Operation

Estimates of these should be predicated on a plant of capacity designed primarily to meet gas requirements economically having regard to the operating program of the plant as a whole, essential to the yield of by-products of quality acceptable to the market at prevailing prices. The plant will naturally be laid out to provide initially for immediate future increases in output and for economical accommodation of additional producing units in the future, as the need for these develops. Estimates of costs of operating labor, maintenance, fuel and sundry operations should be governed accordingly. These may be best developed in collaboration with the oven builders, and by comparison with actual unit figures applying to existing plants of comparable size. For purposes of comparison with future financial results from operation with water gas, by-product gas estimates may be conveniently based upon assumed operation of plant and coal consumption to produce the gas requirements estimated by years, for distributing companies to be served by the project. Due allowance should, of course, be made for gas wastage at the ovens, and for line losses between plant and points of wholesale delivery to such companies. The principal item of gross operating costs is that of coal. The chemical composition and physical structure of this must be such as will produce the required quality of gas and coke. Hence the question of a continuously suitable supply of coal within the maximum allowable price is of vital importance and must be investigated specifically for each situation.

Estimates of receipts from sale of by-products must necessarily be based, first, on average quantities recoverable as a result of operating to produce at least the needed volumes of gas, by years, and, secondly, on obtainable prices for such by-products. These prices are subject to so many controlling factors as to make it hazardous to base judgment upon any single estimate of future prices. The banker who considers the financing of such an enterprise usually and rightly desires to be advised as to what the results would be under the probable worst as well as the probable best conditions. For this reason the by-product quantity items should be valued on the probable lowest, highest and average price levels likely to be encountered for each commodity, based on study of past variation in these, and net costs of gas after credits, developed upon corresponding bases.

With these established, comparative total money results may be developed and shown by years, predicated on the use of the existing and proposed type of gas. It is usually easiest and best to show comparative re-

sults on the assumption that distributing companies will purchase the gas at net cost after credits; in other words, that profits from operation will be concentrated in such companies.

As a matter of practical financing it may be found advisable to construct and develop the enterprise under an independent incorporation, through a plan which will apportion net results from operation between a new company and the distributing companies as their interests may appear and be agreed upon.

Rates

If the above corporate procedure be followed, a most important financial operating problem will center about the adjustment of wholesale rates at which the gas may be sold. These should be such as will reflect the influence on net costs of gas after credits, of quantities and sale of prices of coke, sulphate and tar and other products, if any are produced, and at the same time assure to the distributing companies the accrual of bene-

SOME FINANCIAL OPERATING CHARACTERISTICS—VARIATION BY YEARS
TYPICAL GAS DISTRIBUTING COMPANY

	Unit	1912	1913	1914	1915	1916	1917	1918
Manufacturing Expenses:								
Operating labor	Per M. cu. ft. generated..	$0.037	$0.044	$0.045	$0.044	$0.045	$0.051	$0.057
Gas-making materials	Per M. cu. ft. generated..	0.264	0.306	0.326	0.295	0.278	0.371	0.564
Maintenance	Per M. cu. ft. generated..	0.020	0.012	0.018	0.013	0.013	0.014	0.014
Residuals (credit)	Per M. cu. ft. generated..	0.012	0.013	0.013	0.016	0.021	0.030	0.043
Storage:								
Operation and maintenance	Per M. cu. ft. generated..	$0.002	$0.001	$0.001	$0.002	$0.001	$0.001	$0.001
Distribution:								
Operating labor	Per mile of main.....	$ 106	$ 114	$ 111	$ 106	$ 118	$ 129	$ 156
Meters and consumers' appliances	Per mile of main.....	174	171	170	147	183	155	206
Meters and consumers' appliances	Per consumer	0.984	0.989	0.931	0.780	1.010	0.843	1.084
Maintenance	Per mile of main.....	177	163	204	211	130	229	238
Commercial Expenses:								
Administration, advertising, etc.	Per consumer	$1.44	$1.49	$1.62	$1.61	$1.73	$1.76	$1.45
Administration, advertising, etc.	Per M. cu. ft. sold.....	0.064	0.064	0.072	0.074	0.075	0.076	0.062
General and Miscellaneous:								
Summary (to be analyzed in detail by classes)	Per consumer	$2.69	$3.18	$2.92	$2.68	$3.01	$2.43	$2.56
	Per M. cu. ft. sold.....	0.110	0.138	0.128	0.120	0.130	0.105	0.109
Taxes:								
Property, capitalization, Federal and State revenue	Per consumer	$1.94	$2.35	$2.36	$2.29	$2.40	$2.53	$2.61
	Per cent of gross.....	8.35	9.75	9.92	10.00	10.10	11.00	10.79
Derived Statistics								
Gas Generated:								
Average day	M. cu. ft.....	1,822	1,873	1,952	1,987	2,035	2,142	2,295
Maximum day	M. cu. ft.....	2,412	2,434	2,787	2,521	2,563	3,069	3,028
Ratio average to maximum	Per cent	83.4	84.5	77.2	86.8	87.2	76.8	83.3
Gas-Making Materials:								
Boiler fuel (coal)	Tons per M. cu. ft. gen..	0.0101	0.0088	0.0087	0.0080	0.0084	0.0044	0.0055
Generator fuel	Tons per M. cu. ft. gen..	0.0189	0.0185	0.0186	0.0181	0.0190	0.0195	0.0177
Gas oil	Gal. per M. cu. ft. gen....	4.460	4.390	4.440	4.280	4.320	4.320	4.090
Cost of Gas-Making Materials:								
Boiler fuel (coal)	Per M. cu. ft. generated..	$0.027	$0.025	$0.024	$0.023	$0.024	$0.014	$0.030
Generator fuel	Per M. cu. ft. generated..	0.076	0.077	0.079	0.079	0.085	0.098	0.120
Gas oil	Per M. cu. ft. generated..	0.149	0.195	0.214	0.186	0.159	0.226	0.390
Gas Sold, M. Cu. Ft.:								
By classes	Per consumer—average ..	24.50	25.40	24.94	24.10	25.20	25.40	26.43
	Per mile of main—average	4,340	4,430	4,555	4,565	4,575	4,675	4,855
	Per live serv. con.—aver..	44.35	44.62	44.45	42.91	42.75	43.50	44.68
Gas Unaccounted For:								
Total (corrected for storage)	Per cent of generated....	11.8	9.40	9.34	9.21	8.86	10.38	12.9
	Per mile of main, M. cu. ft.	519	413	424	420	400	486	645
	Per consumer, M. cu. ft...	3.0	2.4	2.3	2.3	2.4	2.6	3.4
Number of Consumers:								
By classes and sizes	Per mile of main—average	195	192	200	208	199	202	208
Live Service Connections	Per mile of main—average	107	109	113	117	118	118	120
Gross Revenues:								
From gas sales	Per M. cu. ft. sold.....	$1.11	$1.10	$1.10	$1.09	$1.08	$1.07	$1.10
From gas sales	Per consumer	24.75	25.60	25.10	24.12	24.81	24.70	25.42
From gas sales	Per mile of main.....	4,382	4,441	4,576	4,573	4,493	4,547	4,851

fits due on account of their participation in the project. The contract between the producing and distributing companies may be so constructed as to provide definitely for such adjustments in the wholesale rate for variations in cost controlling factors as will reflect the accepted basis for distribution of net earnings. The alternative to the variable profit sharing charge so provided for would be the flat rate. If this type of rate is used it must not only be low enough to justify the distributing company in changing its gas, but, on the other hand, high enough to protect the by-product company, in some measure, on low markets for commodities other than gas. With a flat rate the by-product company assumes the risk and absorbs the major profit, while the variable rate presupposes a divided risk and a proportionate allocation of profits. The combination two-part rate, embracing a fixed standby or service charge plus a secondary charge designed to reflect variations in factors affecting cost, may be worked out in a practical way and merits careful consideration, especially where more than one distributing company is to be supplied.

Use of the Chart

As a means of illustrating specifically and briefly the relative weight of the principal factors affecting net cost of by-product oven gas, which must of necessity control the rate at which it can be sold profitably to the distributing company and subsequently by it to the consumer, the inserted graphic cost chart has been prepared. This chart at first glance seems somewhat complicated, but upon examination and study it will be found easy to understand and operate. It, of necessity, omits certain minor factors affecting cost which would have no material effect upon the final answer, and will give results sufficiently close to determine whether further investigation of the factors bearing upon a given case would be warranted.

The following describes briefly the method of using the chart, based upon an example shown by the directional line. This, beginning in the lower left quadrant, finally indicates in the upper right quadrant the per cent return on investment in by-product plant for certain typical conditions as to coal consumption and cost, gas output, new investment charges, operating expenses, sale prices of coke, sulphate and tar, and the rate at which gas may be sold to the distributing company. The chart is so constructed as to provide for determining the effect of wide variations in any or all of the above factors. For situations where the conditions may be beyond the limits of the chart, necessarily restricted herein as to size, it may still be used by employing proportional factors.

Starting at the lower left scale of coal quantity consumed during the month project horizontally to the line of monthly gas output, thence vertically to the intersection with the horizontal scale such as at point C. From this point project downward to the right at 45 degrees to intersection with scale at point S, which latter should be marked for later use.

Going back to point C, project upwards therefrom to the line of coal cost per ton, assumed in this case as $4.15, and thence horizontally to scale at point T, which point is held and used in the next succeeding step. On scale to the right in quadrant III, establish the point of monthly output O, and project, as shown, to the left to intersection with curved line representing investment in by-product plant as at point O_1. From this point project upwards to horizontal scale at top representing fixed charges at 10 per cent, point D. If fixed charges exceed 10 per cent, project from point D down to the right at 45 degrees to intersection with the line of existing fixed charges assumed in this case as 11.25 per cent, point F. Drop vertically downward from point F to intersection with horizontal projection from point T. Such intersection is at point J in this case. From point J project down to the right at 45 degrees to scale at point C, which is to be marked for use in the next step.

From the horizontal scale of monthly operating costs at the base of quadrant IV, say at point H, project upwards to the line of gas output, point A, and thence horizontally to intersection with vertical line projected down from point C. Such intersection is shown at point A, from which point project down at 45 degrees to scale establishing the point B.

Quadrants V, VI and VII shows the effect of variations in sale price of coke, sulphate and tar upon net cost of gas produced.

Starting at point S, established on scale quadrant V, project horizontally to line of coke price per ton, and thence vertically to the scales of sulphate and tar prices. These have been assumed in this case at $3 per cwt. for sulphate and 3 cents per gallon for tar. For variations of these project parallel to the inclined lines to intersection with horizontal price lines for these commodities, and thence vertically upwards to intersection with horizontal line extended from point B on scale to the left of quadrant VIII.

From this intersection at point E, project up to the right, parallel to the inclined line to scale at point L, representing net cost of by-product oven gas, after credits.

Quadrants IX compares various net costs of gas produced with various rates at which such gas may be sold wholesale to the distributing company, and reflects on scale P the total profit to the by-product plant for different quantities of gas sold for any combination of net production costs and wholesale rates.

Quadrant X reflects total profits scale P on scale P_1, as per cent of investment in by-product plant.

Questions It Will Answer

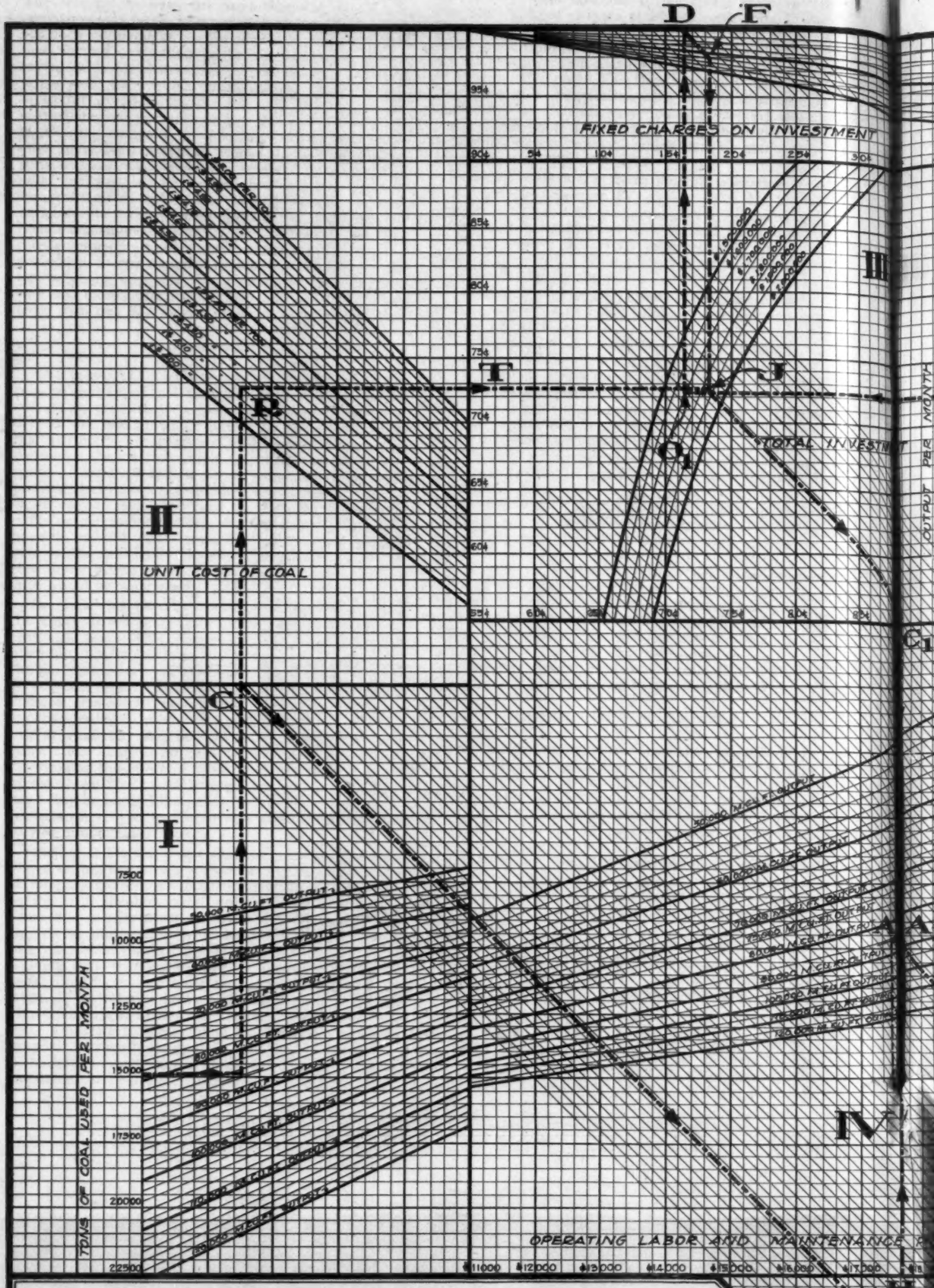
While the foregoing explanation may be difficult to absorb on first reading, a little practice will give facility in using the chart forward and backward so that the effect of variation of any of the factors can be studied and weighed for any combination of conditions. For example, the chart can be used to answer quickly such questions as these:

(1) What rate should be charged distributing company for various quantities of gas in order to produce a 15 per cent return after fixed charges on by-product investment of $1,500,000 if net cost after credits is 20 cents per 1,000 cu ft.?

(2) What quantity of gas must be taken by distributing company to produce a 10 per cent return, after fixed charges, on a by-product plant investment of $1,200,000 if gas is sold at 40 cents and costs 18 cents per 1,000 cu. ft.?

(3) What is the amount of investment on which 10 per cent, after fixed charges, can be earned if distributing takes a certain quantity of gas at 35 cents, which gas costs 15 cents per 1,000 cu. ft. after credits?

(4) What is the approximate minimum price at



BY-PRODUCT · COKE · OVEN · GAS PRODUCTION · COSTS · AND · RATES

VARIATION OF COST OF GAS AND RATES AT WHICH IT MUST BE SOLD TO DISTRIBUTING COMPANIES TO YIELD A GIVEN PROFIT UNDER VARYING CONDITIONS OF GAS OUTPUT, INVESTMENT IN BY-PRODUCT PLANT, COST OF COAL AND LABOR, AND MARKET PRICES FOR COKE, AMMONIUM SULPHATE AND TAR. BASED UPON THE RECOVERY OF .97 TON OF COKE, 20 POUNDS OF AMMONIUM SULPHATE AND 9 GALLONS OF TAR PER TON OF COAL FIRED.

DIRECTIONAL LINE ——→ ILLUSTRATES METHOD OF USING CHART

KELLY · COOKE · & · COMPANY
ENGINEERS
PHILADELPHIA

OCTOBER · 1919

BASIC FORMULAE

$$N_c = \frac{1F + 12E - Q(8.4K + 2.4S + 10.8T - 12C)}{12G}$$

$$R = N_c + \frac{1F + 12E - Q(8.4K + 2.4S + 10.8T - 12C)}{P1N_c}$$

N_c = Net Cost of Gas per M.cu.ft after Credits from Sale of By-Products
1 = Investment in By-Product Plant
F = Fixed Charges, Interest, Taxes, Insurance, Amortization in per cent of Investment.
E = Operating Expenses per Month other than Coal.
Q = Tons of Coal Fired per Month.
C = Average Cost of Coal in Dollars per Ton
K = Selling Price of Coke in Dollars per Ton
S = " " " Sulphate in Dollars per Cwt
T = " " " Tar in Dollars per Gallon
G = Gas delivered to Distributing Companies per Month-Mcu.ft.
R = Rate at which Gas must be sold to Distributing Companies to yield P% Profit over and above Fixed Charges of F% on Investment

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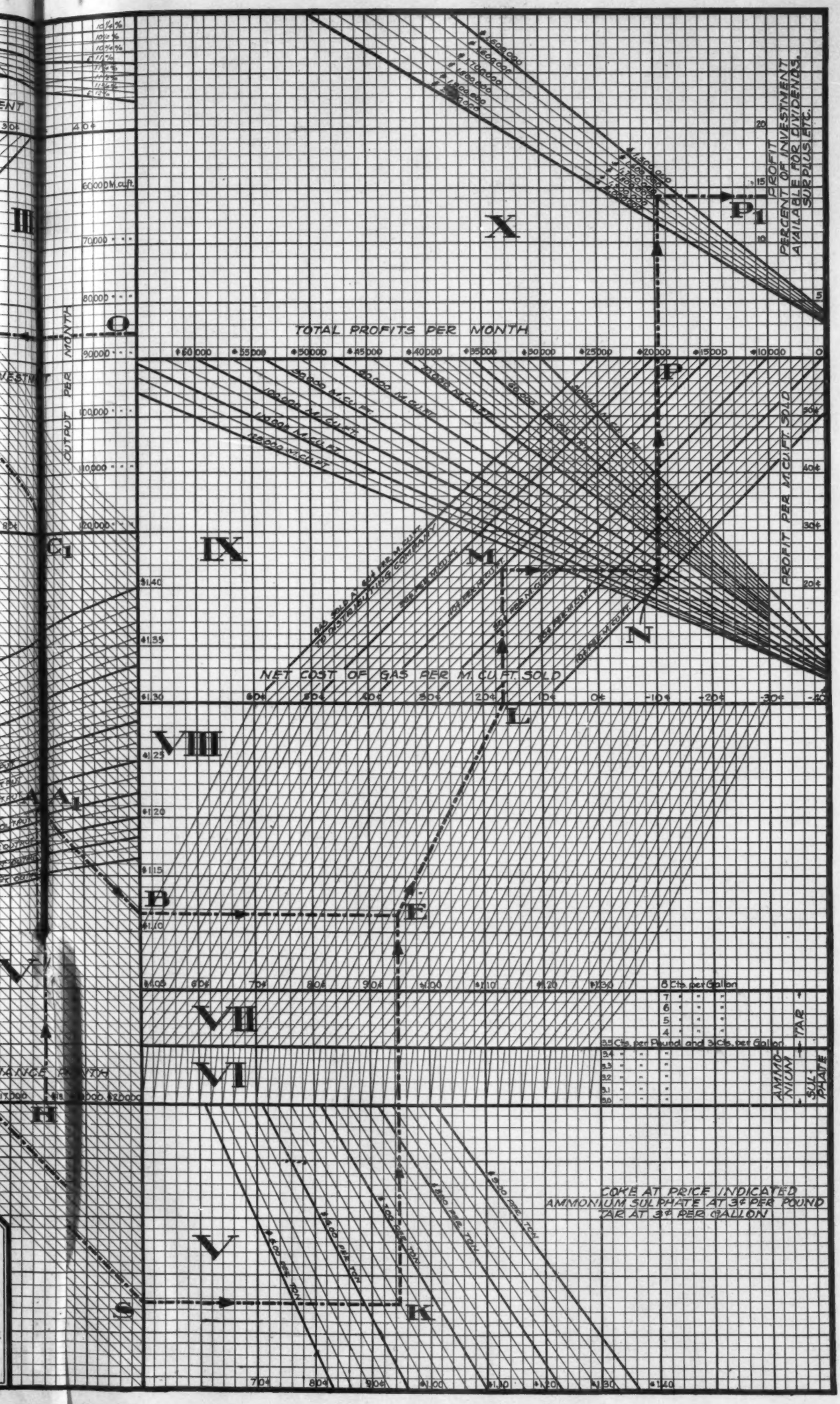

919, American Engineering Journal.

which coke can be sold to produce a 10 per cent return on investment if distributing company takes a given quantity of gas at 40 cents?

(5) If the by-product plant is operated through a separate company, what rates should be charged distributing company in order that these will reflect such basis for division of profits as may be agreed upon where the division is based on cost controlling factors?

(6) What is the maximum price that can be paid for coal under given conditions as to plant output, investment, operating charges and credits, to yield a return of 15 per cent on investment?

These and other similarly important commercial questions of vital bearing upon financial results from operation can be readily answered through practised working of the chart. It yields an excellent perspective of the relations which the interlocking cost factors bear to the commercial problem involved in the operation of the by-product plant primarily as a source of gas supply. The application of this chart to a given situation will give a very fair indication of financial possibilities in the use of by-product gas and whether further investigation is worth while.

For the by-product coke oven plant now in operation and supplying gas for commercial consumption, a chart similar to that herein illustrated, can be constructed with modifications and extensions to take account of special local conditions of operation affecting cost. Such a chart, utilized in conjunction with a correlated system of statistics relating to operating data and cost accounting, would be an invaluable aid as a general commercial index to the operating organization.

General Formulae

For a plant producing only gas, coke, sulphate and tar, the following formulæ will give a fairly close estimate of the net cost of gas after credits, and the rate at which such gas must be sold to yield a given profit to the by-product plant on its investment, over and above all fixed charges and operating costs. For a given set of conditions as to by-product yield ratios a chart of this type and related formulæ will give identical results. By rearrangement, the formulæ may likewise be used for solution of the broader commercial questions such as above outlined in connection with the chart.

$$Nc = \frac{IF + 12E - Q\,(8.4K + 2.4S + 108T - 12C)}{12G}$$

$$R = Nc + \frac{PINc}{IF + 12E - Q\,(8.4K + 2.4S + 108T - 12C)}$$

Nc = Net cost of gas per 1,000 cu. ft. after credits from sale of by-products.
I = Investment in by-product plant.
F = Fixed charges, interest taxes, insurance amortization in per cent of investment.
E = Operating expenses per month other than coal.
Q = Tons of coal fired per month.
C = Average cost of coal, dollars per ton.
K = Selling price of coke, dollars per ton.
S = Selling price of sulphate, dollars per cwt.
T = Selling price of tar, dollars per gallon.
G = Gas delivered to distributing companies per month.
R = Rate at which gas must be sold to distributing companies to yield P per cent profit over and above fixed charges F per cent on investment.

Power Gas Producers

For some time past in England there has been very keen rivalry between the makers of suction gas plants using wood fuel and those using coke or charcoal fuel, and such remarkable figures have been claimed by the advocates of the various systems that it might be of interest in the first place to look impartially into the theoretical values of the two kinds of fuel used, and the changes that take place in the furnace resulting in the production of gas.

To avoid unnecessarily lengthening this article, certain axioms on which calculation are to be based must be stated as follows:

1. Dry wood of all kinds, weight for weight, contained approximately 50 per cent charcoal, the remainder being hydrogen and oxygen in the proportion to form water, and 0.5 to 1.5 per cent of ash.
2. The heat value (B.t.u.) of 2 lb. of dry charcoal is 14,600 units.
3. Air dried wood contains about 25 per cent of moisture.

When wood undergoes partial combustion in covered heaps or in semi-closed retorts, the charcoal yield does not exceed 25 per cent by weight, but when placed in sealed retorts 33 per cent yield of charcoal may be gained. In the latter method, however, fuel must be used to heat the retorts, so that the net results is approximately the same for both systems.

The B.t.u. of 1 lb. of perfectly dry wood may be theoretically obtained by the use of Dulong's formula, and assuming the composition of wood to be as follows:

	Per Cent
Carbon or charcoal	50
Hydrogen	7
Oxygen	42.5
Ash	0.5

(Nitrogen—1 or 2 per cent—is always present in wood, but for the purpose of this calculation it can be neglected.)

Air dried wood contained 25 per cent of moisture, so that for every 1 lb. weight of wood 75 per cent heat producing. The B.t.u. of the wood above considered is, therefore, 6,261 gross B.t.u., and while varied and diverse opinions exist as to the use of steam in increasing the heat generated by a furnace, the fact remains that theoretically as much heat is absorbed by the breaking up of H_2O as is required to form H_2O by the burning of hydrogen in oxygen. This amount of heat is 62,000 B.t.u. per pound of hydrogen burned. Sufficient heat is thus absorbed in the burning of 1 lb. of wood fuel to evaporate the ¼ in. of water contained therein, so that the net value of the wood will be about 300 B.t.u. less than the figure above, or 5,961 B.t.u. net. The heating value of wood is therefore equal only to 0.41 lb. of charcoal.

What takes place in the suction producer to evolve gas? Taking coke or charcoal as the fuel used, we know that carbon burned to CO_2 evolves 14,600 B.t.u. per lb. of carbon. In a limited quantity of air (as in the producer) the carbon is burned only to CO, thus evolving 4,450 B.t.u. per lb. in the furnace of the producer itself; the balance heat rendered latent in the CO is evolved when converting the CO to CO_2 in the engine explosion.

The approximate composition of air is 77 per cent

nitrogen and 23 per cent oxygen. It follows then that to completely burn half a pound of carbon to CO, 2¾ to 3 lb. of air is required, and 44 cu. ft. of gas (CO N) is evolved in the liberation of 4,450 B.t.u. Burning the CO in this mixture the CO will result in the generation of 10,151 B.rg.u., or 4,300 B.t.u. per unit of CO consumed. The value of a gas having this composition is, therefore, 100 B.t.u. per cu. ft.

The reaction C O = CO requires a high temperature, for the proportion of CO_2 increases as the temperature falls, even with a limited supply of air.

It is customary to introduce steam to the extent of approximately 25 per cent with the air entering the producer, thus enriching the gas by a supply of hydrogen. With due allowance for this added hydrogen and the small quantity of CO_2 which is certain to be present, 135 to 140 B.t.u. may be taken as a fair value for suction gas from coke or charcoal.

When wood is used as fuel, carbon must be converted into CO_2 in order to liberate enough heat to drive off the volatile constituents of the wood before the formation of CO can be started. These volatile constituents are composed of hydrogen and oxygen, so that an excess of oxygen is present, tending to the formation of CO_2. The wood as it is burnt in the producer furnace forms, where the oxygen is more excluded, a thick layer of incandescent carbon or charcoal, and in order to produce a useful CO gas the heat must be sufficient to break up a great deal of the CO_2 formed.

Very good authorities state "that a fuel bed at a temperature of 1,300 to 1,800 deg. Fahr. is necessary to produce CO from charcoal, and that a temperature of 2,000 deg. Fahr. and upwards is necessary to produce CO and CO_2 and charcoal.." This explains the cause of the enormously high temperature recorded in wood producers. Any temperature above that necessary to produce a combination of 9 per cent CO and 10 per cent CO_2 would be detrimental to the materials composing the furnace, but in actual practice (allowing the presence of hydrogen to be the same in both classes of producer) there is 15 to 20 per cent, by weight, more inert gas produced in the use of wood fuel than in the use of coke or charcoal. The value of suction gas from wood per cu. ft. may be taken as 115 to 120 B.t.u.

The subject of the changes in the decomposition of wood by heat, in which so many combinations and recombinations of the elements takes place is a very deep one.

Before dealing with the sealed retort method, which cannot properly be compared with suction producers, it might be as well to bring the results previously recorded to a form in which they will be of more interest to engineers, and to express the figures in values or horsepower (1 hp. hr. = 2,545 B.t.u. per hour).

The efficiency of a gas engine does not generally exceed 33 per cent, or that of a producer 75 per cent. The B.t.u. required to generate 1 hp. (b.hp.) in an engine on this basis must, therefore, be about 10,281. As has been shown one lb. of carbon is equivalent to 14,600 B.t.u. Therefore, 0.704 lb., or nearly ¾ lb. of carbon, is required to generate one hp. It is not generally found in practice, however, that coke or charcoal is 100 per cent carbon, so that the actual figure will be nearer one lb. per b.hp., which figure manufacturers of present day producers will guarantee.

Actually the efficiency of a wood producer is not as high as a charcoal producer for reasons before enumerated, but, giving it the benefit of the doubt, on the same lines as above, 1,725, or nearly 1¾ in. of wood is required to generate one hp. The decision, therefore (apart from the cost of labor), as to which system should be used depends in the cost per B.t.u. of the fuel obtainable. Coke or charcoal is sold by weight, and usually contains a small percentage of water. Wood is sold by the cord.

In an average plant, what is really of more importance than the full load consumption is the "cost of fuel per 24 hours," or the average load plus standby fuel consumption. Tests have been carried out on both fuels, and it is found that for a given load factor and stated periods of idleness the ratio of the two fuels is practically as above stated. The figures obtained are 1.65 and 4.37 lb. per hp. for coke or charcoal and wood respectively on engines of the same size, 20 per cent load factor working for twelve hours and shut down for twelve hours. The best results are, of course, obtained if the full load is generated throughout the shift; that is very seldom the condition obtained in practice, but the ratio would be much the same, as the efficiency would increase in both kinds of producers. The capacity of the engine is reduced in the proportion of 6:7 by the use of wood-gas by reason of its lower calorific value.

A point which is very seldom looked at, and one which is only been hinted at in this article, is the quantity of water required for gas production and for scrubbing purposes. In general practice the quantity required exceeds that stated by manufacturers (about 2 gallons per hp.). The water required depends greatly on local conditions and the state of the fuel to be used. The amount of water for scrubbing and cooling the gas from wood producers exceeds that required for coke or charcoal by reason of the large amount of vapor carried over, which must be condensed before the gas reaches the engine.

The sealed retort system, which is technically described as the "destructive distillation of wood," as has been said is so dissimilar to the suction producer that no useful comparison of the wood system is commonly used in the chemical world for recovering acetic acid, acetone, methyl, alcohol and allied hydrocarbons composed of carbon, hydrogen and oxygen which form the volatile constituents of wood. The wood to be heated is split into small sizes, placed in the cast iron or fire clap retorts, sealed, and subjected to external heat, as in the process of coal gas manufacture. Very varied results are obtained according to the temperature at which the retorts are maintained, thus the arrangements varies with the purpose for which the distillation is required, viz.: (a) chemical recovery or (b) gas for power. When used in conjunction with a charcoal suction producer, as will be shown later, higher advantages are obtained.

The retorts are heated to the required temperature, between 1,000 deg. and 1,650 deg. Fahr. for gas making. The volatile constituents are thus vaporized and driven into a water cooled condenser, the temperature of which is not allowed to rise above 100 or 120 deg. Fahr. In this condenser are thrown down tar and crude pyroligneous acid. From this acid alcohol

(*Continued on page 495.*)

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As the Journal Views It

The Horse Before the Cart

Directly ahead of the gas industry lies its era of greatest promise. But intervening—in the transition period—the outlook is dismal.

Gas oil, the backbone of the water gas process, has attained prices that would have frightened water gas producers of a few years ago out of business had they sensed even their possibility.

Gas coal is high and even the most optimistic cannot feel assured that it is at its highest. Charles B. Cooke, Jr., in his article printed elsewhere in this issue, reveals to us a most startling relation between the cost of coal at the mines and the cost of mining labor—70 per cent of the former being absorbed in the latter.

Sane persons feel that the miners have gotten beyond the point of reason in their compensation. They do not feel assured, however, that they will not get even more in the future.

And, labor being the bulk of the cost, there seems no likely possibility that we have reached the turn in the road as to coal prices even yet.

Higher rates are a possibility where not already established. But not to a sufficient degree to provide the solution of our most vital problem. They come haltingly and in driblets, after expensive controversy and wrangling, and too often so tardily that by the time we get them we are no better off. A continuance of rising costs has absorbed their benefit and we are again at the point where we started.

Mr. Cooke suggests the by-product coke oven, not only for the large city supply, but for the small city supply in groups, as the remedy.

He sets forth basic and controlling financial engi-

neering and economic questions related thereto, the proper solution of which will indicate the probable financial results from the use of the by-product oven plant in any given situation, and will provide the ammunition necessary for the projector's onslaught upon the money marts.

Mr. Cooke's article is a valuable contribution. With the factor of timeliness linked on, it is possibly one of the most valuable contributions this or any other gas journal has ever published.

It tells the gas man nothing of the structural features of by-product plants or how to operate them, but definitely how to answer the questions that must be answered before the structural features and operation are even worth considering.

In short, Mr. Cooke puts the horse before the cart, instead of vice versa as has been the custom in our industry as related to the by-product oven.

His article and the chart which accompanies it are amply worthy of the study of the gas man, big and little, and the financier. As such it is offered for the guidance of the readers of the AMERICAN GAS ENGINEERING JOURNAL.

Minds or Money

The gas industry does not grasp quickly at each new method that is developed. Its conservatism in this respect has been ascribed to mental inertia on the part of the men who are conducting it.

When we think of the gas industry in the terms of numbers of people engaged in it, it seems a small industry. When we think of it in terms of money invested in it, it ranks up as huge.

The slowness of the gas industry in revolutionizing its methods if traced to its source, we think, will be found attributable to money sense rather than to any lack of initiative or progressiveness in the mental attitude of the men who are heading its individual companies.

Capital dislikes changes. It has reason to when vast sums are already invested. The change over is sometimes expensive beyond the hope of recouping.

Sometimes, too, we have a sneaking feeling, it is fortunate for all of us that the type of man at the head of our companies thinks twice, and then again for good measure before he starts chasing new idols.

A single instance will illustrate.

A few years ago the welded main of relatively short life appeared to be making a good case for itself. Company after company was dazzled at its flexibility, its tightness and relative economy of installation.

It was conceded that within a definite period it would give out, and on the top of the concession it was demonstrated that even so we could relay it and go on relaying it indefinitely with a less cost in the long run than a main of practically endless life, which weighed more per foot, cost more to lay per foot and with which connections and line adjustments were a matter of moment.

The advocates of the new idea, the makers and sellers of the new kind of main waxed desperate at the plodding gas man's slowness at seeing what to them was so obvious.

A gas company that was so large that it would seem must be of necessity supplied with some men of progressive intelligence at least seemed particularly stubborn in sticking to its old ways.

And in the height of the glory of the new idea in distribution, one of this company's executives, an engineer of high standing, incidentally emphasized its conservatism in an address before a technical society by dating the era of permanence of the gas industry from the introduction of cast-iron mains. This, to the minds of the advocates of the new idea, seemed like glorying in stagnation.

To-day this company's attitude stands justified. Some companies whose streets are merely dirt roads might be able to do a considerable proportion of replacement work at this time. This particular company, if it had to do likewise, would go broke even if it had five times as much available capital as it has. Every hole it digs in the street costs money to an extent that would make the small town man stand aghast.

Probably there are as many potential plungers, "take a chance" fellows," come into the gas field as into any other industry. But they never climb very high.

The man who gets away up in the gas field is the kind that looks both ways—forward and backwards. He bites the coin, so to speak.

The invested capital in the gas field is too much out of proportion to the number of men responsible for its security to permit of much haphazard changing about in methods and equipment. This fact acts as a restraining influence on snap judgments. The gas man changes, but when he does he has looked ahead so searchingly that it is as near to certain as anything can humanly be that the saying effected will be actual and proportioned to the expenditure.

The Public Utility Industry Commended by Investment Bankers

The Investment Bankers' Association of America makes the following statement in its annual report relative to the public utility industry:

"It should not be difficult to educate the public to renewed and increasing confidence in an industry which has proven itself, even in the crisis of war, so stable, resourceful, resilient and productive, and which offers convincing promise for safe and remunerative employment of enormous additional capital."

Power Gas Producers

(*Continued from page* 492.)

and acetates are recovered in the chemical works, but for gas making the acid is of no practical value, except that the volatiles contained may be used to assist the fuel for heating the retorts.

The non-condensibles or gases that are fixed at or above 750 deg. Fahr. are then passed over lime, thoroughly washed, and lead to a gasometer, which is a necessary part of the equipment, because the first gas given off is poorer than when the moisture and condensibles have been driven off. The charge takes 3½ to 4 hours to distill, and an interval of about seven minutes is required for recharging. The necessity of a buffer or mixing gasometer is therefore seen.

The changes that take place in the seal retorts are much the same as those in the suction producer, with the exception that no external oxygen comes in contact with the wood or its products. The application heat breaks up the CHO and N components, and reform them into various combinations, which are known as methyl alcohol, amylic alcohol, ethers, acetone, butyric acid, acetics, etc. Some of these are fixed gases at low temperatures and some condensibles. As before stated, the results obtained vary considerably with the temperature at which the distillation takes place. At a low temperature a higher yield of charcoal, smaller quantity of gas, and higher yield of condensibles are obtained. Moreover, the quality of the charcoal varies greatly with the temperature. The charcoal obtained at a low temperature, though greater in quantity, contains a smaller percentage of carbon than that produced at a high temperature.

The reason for these results will be understood when it is explained that in distilling wood quickly the elements of the vaporized CO_2 and H_2O become dissociated in contact with the heated carbon. The CO_2 being converted into CO, and the hydrogen and oxygen combining with carbon to form hydrocarbides and CO combinations, the quantity and combinations constantly vary.

Turning now to the practical side. In a furnace containing two retorts, each holding about 200 in. weight of wood, the process of distillation takes from three to four hours. The product from each retort will be 60 in. of charcoal, half a gallon of tar, and 600 to 650 cu. ft. of gas of an average calorific value of 350 B.t.u. To heat the furnace 50 lb. of wood per hour is required. We can now arrive at the amount of wood per b.hp. for purposes of comparison with the suction producer using fuel.

Summarized, the results may be stated as follows:

Wood retorted	400 lb.
Wood used as fuel	200 lb.
Wood yield, 120 lb. charcoal, 1 gal. tar, 1,250 cu. ft. gas	600 lb.
1,250 cu. ft. gas, at 350 B.t.u. equals	437,500 B.t.u.
120 lb. charcoal at 14,600 B.t.u. equals	1,752,000 B.t.u.
Total	2,189,500 B.t.u.

This system shows a recovery of 3647.5 B.t.u., being 61½ per cent of the available heat per lb of wood used. Tar is entirely extracted from the wood and gas, and therefore there can be no fear of it getting into the engine, even with a low fire. As the tar is available for sale as a by-product it can be credited to the fuel bill.

A comparative statement on a pence for pence (2 cents) per B.t.u. basis would be:

Suction producer X pence purchases 1 lb. wood.

Sealed retort X pence purchases 1½ lb. wood. So that, allowing 75 per cent efficiency, 4,470 B.t.u. per lb. of wood is recover d in a suction wood producer, and 4,740 B.t.u. in a sealed retort. Due allowance has been made for 25 per cent loss of heat in the charcoal producer.

Although these results are approximately the same, there is a difference which has the effect of increasing the total output capacity of the plant. It has been shown that the gas from the wood producer has the effect of restricting the output capacity of an engine rated for coke or charcoal gas. By the combination of the richer gas from the retorts with that from the charcoal producer, the output capacity of the plant is increased.

A petrol electric plant in a large establishment was recently replaced with a sealed retort producer, and a 1,200 cu. ft. gasometer. Though the petrol set was worked every night at cost of £4/4/- (about $20) per week, the retorts yielded enough gas when worked every alternate night to run the engine every night, using one and one-third cores of wood per week. While more labor is entailed in the sealed retort method, the extra labor can be usefully employed in other directions, for whole-time services are not required. Allowing for the time that may be occupied with the plant, a saving results.

September Comparative Earnings of Portland Oregon Company

The Portland Gas & Coke Company, of Portland, Ore., have issued the following statement of earnings for September, 1919, showing comparison with the same month last year:

	1919	1918
September gross	$ 190,275	$ 173,504
Net after taxes	88,172	81,364
Surplus after charges	59,040	51,707
Twelve months' gross	2,080,000	1,668,764
Net after taxes	900,076	752,213
Surplus after charges	549,401	400,688
Balance after preferred dividend	391,394	260,411

Total Net Income of Massachusetts Lighting Companies Decreased

The gross earnings of the gas and electric companies controlled by the Massachusetts Light Companies in the twelve months ended Sept. 30, 1919, amounted to 1,681,746, compared with $1,908,103 in the corresponding period a year ago; net earnings compared $362,387 with $466,612; and the total net income was $382,572, against $473,565 a year ago.

Nature of the Coal Substance

The "Action of Pyridine Upon the Coal Substance" is a research which was carried out by the instance of the British Association Fuel Economy Committee, with the view of clearing up certain discrepancies in the work of previous investigators, and thus extending our knowledge of the nature of coal.

The solvent action of pyridine on coal was originally brought to notice by Dr. Bedson in 1899, since which time the subject has been investigated by numerous chemists, with results that have given rise to a considerable amount of controversy. As remarked by the authors of the classic monograph prepared in England for the Department of Scientific and Industrial Research, the use of pyridine as a solvent for coal has long been open to the suspicion that the action is not of the simple solution, but that pyridine performs the part of a true reagent, and acts chemically upon certain of the constituents present in the coal. Drs. Stops and Wheeler give an admirable resume, in the above mentioned monograph, of the results of these investigations, which appear to leave still in doubt the question whether the pyridine extract is to be regarded as an unaltered component of the original coal; and they remark that among some of the difficulties encountered in experimental work in this direction are the facts that it is not an easy matter to remove completely all traces of pyridine, either from the extract or from the residue; and also that both the extract and the residue, like coal itself, absorb oxygen from the air. Moreover, an accurate quantitative estimation of the extract can only be made if the coal is dry and the pyridine is both dry and pure.

With simple precautions, however, Messrs. Clark and Wheeler claim that by the agency of pyridine a complete separation can be made of the resinic from the cellulosic constituents of coal, a conclusion which Prof. Bone and Mr. Sarjant criticize in the paper under review, upon the ground that insufficient has been given to the nitrogenous portion of the coal substances, since they have discovered that after treating the pyridine extract with chloroform, as recommended by Messrs. Clark and Wheeler, the resulting substance, although for the most part resinous in character, contained both nitrogen and sulphur and cannot, therefore, be regarded as pure resin.

Another no less interesting conclusion arrived at by Prof. Bone and Mr. Sarjant is that there seems to be no real point to the reaction between pyridine and coal. Apparently, the solvent action never entirely ceases, but, in the opinion of the authors, is a complex process, involving, besides the rapid solution of the resins present in the coal, a simultaneous and much slower "unbuilding" or depolymerization of the whole coal structure, which is thus gradually brought into a soluble condition. They obtained results, also, which seem to point to the conclusion that coals differ in their affinity for pyridine, implying that some coal structure are more readily "unbuilt" than others, viz., that some coals are more complex and difficult to resolve than others. This was particularly noticeable in comparing the action of pyridine upon Durham coking coal and Barnsley coal, and the inference may possibly be drawn that the coking properties of coal are connected with an increased complexity of the coal structure.

In regard to these results, there are still other questions remaining for further investigations, and we are glad that the authors promise a further communication upon the subject, which will undoubtedly throw much further light upon the pyridine extract problem. As far as they have yet gone, the results seem to prove conclusively that: "Besides any ordinary solvent action which pyridine may have upon the resinic constituents, which is probably fairly rapid, it also, at the same time, slowly attacks and resolves into simpler molecular aggregates the complex structure of the coal substances as a whole." The author's conclusions also help to explain the difficulty in obtaining comparable results with this reagent unless care is taken to exclude access of oxygen during the extraction, which they attribute to the fact that oxygen has an important retarding action upon the process. The results are also shown to be affected, as stated by Messrs. Clark and Wheeler, by the fineness of the grinding of the carefully dried coal, the purity and dryness of the pyridine, and the temperature conditions during the experiment.

How, then, does this question now stand? We are inclined to regard it rather from the practical than from the purely academic standpoint. There are, of course, many chemical reactions of important practical application, in which definite points and precisely concordant results are not attainable. So far as the experiments seem to imply, the depolymerizing process is almost insignificant from a quantitative standpoint, in comparison with the presumably solvent action upon the resins. The fact seems, therefore, to remain that we still have in pyridine a solvent of possible practical value in the differentiation of various type of coal, but there is still room for further investigation upon the subject. What would be interesting, for example, would be some further work in the direction pursued by Wahl and Bagard in 1913, in which pyridine was employed as an etching medium for polished coal surfaces, notwithstanding the disappointing results obtained by Drs. Stopes and Wheeler in a similar investigation.

Natural Gas Statistics

More than 2,100 cities and towns in the United States are supplied with natural gas. The average price per 1,000 cu. ft. charged to domestic consumers of natural gas in the United States is about thirty cents. The average price charged to manufacturers is less than twelve cents.

Most of the towns and cities supplied with natural gas are in New York, Pennsylvania, Ohio, West Virginia, Kansas, Oklahoma and California. In Ohio 872,000 domestic consumers are supplied, in Pennsylvania 480,000, in California 239,000, in West Virginia 120,000 and in Oklahoma 95,000. The industrial consumers, by whom the gas is used for manufactures or for generating power, use twice as much gas as the domestic consumers.

During the present century the value of the natural gas used in the United States has risen annually without break from $27,000,000 to $142,000,000 and is still rising.

The Greatest Asset of Any Gas Company Consists in the Reliable Information and Help It Gives Its Consumers

A Hundred Years of Experience Have Demonstrated that the Consumer Will Not Come to the Company for Gas Education, Therefore, in Its Own Interest, It Is Up to the Company to Go to the Consumer

F. J. Schafer, superintendent of the Southern California Gas Company, in his paper read before the twenty-sixth annual convention of the Pacific Coast Gas Association, gives a short review of complaints for the benefit of gas company and gas consumer.

However good the quality of gas supplied by the gas company may be, the consumer, through want of knowledge of some simple facts connected with gas measurement and proper gas use, may be caused not only annoyance and disappointment, but unnecessary expense as well. Unfortunately, this lack of knowledge on the part of the consumer is sometimes aggravated by the possibly unintentional delinquencies of the uniformed or impatient gas company employee who does not realize or rise to the importance of the occasion, and my self-imposed task is here—forgetting for the time being my connection with the gas industry in as far as this connection might bias me on the side of the company—to attempt in a small way to present the matter as it would appear to an entirely disinterested and fair minded outsider, to the end that gas company and gas consumer may have a better understanding of each other, which is of such paramount importance to their pleasant and peaceful relations.

Measurement of Gas

There is probably not one member of this Pacific Coast Gas Association who is not familiar with the monthly accumulation of complaints on account of excessive cost and deficient heat. The first is invariably attributed to the inaccuracy of the meter and the latter to the bad quality of the gas, and it is a difficult undertaking to convince consumers so complaining that the fault rests largely with themselves. With the exception of the time indicator, there is probably no mechanical instrument more in use than the gas meter, which at the same time is so little understood. This want of knowledge on the part of the consumer, and the neglect or inability to adequately explain on the part of the gas company through its employees, causes much distrust and suspicion, especially when it is remembered that all the extravagance of improper combustion, needless and wasteful use, accidental losses, leaks, etc., are faithfully recorded and brought to the account of the consumer.

Extraordinary circumstances in which the gas meter is assigned the undeserved vampire role, occur daily and might be mentioned by thousands, where the consumer, not being able to find any other reason, wrongfully charges these evils against this unoffending and trustworthy measuring device. The needless and useless controversies between gas consumer and gas company employees under such circumstances are beyond description. No attempt at this description will be made in this instance, and since we are all more interested in cause than in effect, my endeavor will be rather to show the accuracy and fidelity of the instrument in question. At the same time, no pretension is made that it is impossible for a meter to err in time, since no mechanical instrument, however well constructed or properly adjusted, can last forever. However, when such errors occur, they will nearly always be in favor of the consumer and, therefore of necessity, at the expense of the gas company.

The measurement of solids or liquids is easily understood, for by their opaqueness they are visible, and by their weight are readily transferred from one container to another. But with gas the case is different; since it is invisible and so elusive that it requires special manipulation to prevent its loss, its measurement is somewhat more complicated to the uninitiated.

If a toy balloon be attached to a gas fixture and filled with gas, if it is then detached and pressed between two flat surfaces so as to expel the contents, it is certain that, if the amount of gas contained in the balloon be known—and this is easily ascertainable—by this means gas could be measured in an impractical way, though with perfect accuracy. Assuming this balloon to contain 1 cu. ft. of gas, then the number of times the balloon is filled and emptied in a given time would represent the total amount of gas measured during such a period. This is exactly the principle employed in the gas meter where leather diaphragms take the place of the balloon, and the motion

of these diaphragms in filling and emptying is communicated by suitable means to the clockwork which indicates on the face of the dial, through the position of the hands, the amount of gas passed. Unlike a timepiece, this clockwork will not run fast or slow, except as more or less gas is passed, and the indication hands cannot be moved faster or slower than the diaphragms are filling and emptying. Therefore, any error in measurement will not be due to the indicator, but would originate in other working parts.

Among the ordinary things that could happen to the interior of the domestic gas meter, there are—at least as far as climatic conditions in California are concerned—only two that would operate against the consumer, and either of the two are of comparatively rare occurrence. The first would be due to shrinkage of the leather diaphragms and the second to deposits of condensation in the measuring compartments; while all parts of the meter subject to wear and tear would tend to make it slow and in favor of the consumer.

It is probably not amiss to call attention to the popular error entertained by many gas consumers who assert that the gas company supplies them with excessive pressure, to the end that the meter would spin around faster, thereby helping to increase the gas bill. Nothing is more ridiculous than this assertion, inasmuch as gas cannot pass through the meter quicker, regardless of the pressure, unless the consumer is either using the gas or wasting it. As a matter of fact, increased pressure at the meter with proper use at the appliance consuming the gas, would benefit the consumer for the reason that gas is compressible and the meter measures volume only. If any gas company were foolish enough to supply its consumers with gas at a pressure of, say 15 lb., and charge for it on the basis of meter measurement, the consumer would obtain 2 cu. ft. of gas for every cubic foot for which he pays.

It has also been my experience to come in contact with people who claim that they have actually watched their meter when no gas was being used—caught it in the act—and according to their story, the meter was merrily spinning on, piling up foot after foot on the indicator, thereby reaping a harvest of dishonest gold for the overflowing coffers of the gas company. In a case of this kind, there can be but two explanations for the wonderful performance; either there is a leak somewhere on the premises or the tale was born of magnified and unjust suspicion and had no foundation in fact. If the construction of the meter were only partially understood it would be known that the operation of the meter depends absolutely on flowing gas, and when the flow is stopped the meter has been deprived of the energy which made it move.

The gas meter then, granting that it had been properly made and adjusted, cannot, except in comparatively rare instances, register against the consumer, as each measuring compartment must be filled and emptied in succession the necessary number of times to indicate the corresponding quantity on the meter dial. But in common with other mechanical devices, the meter is subject to wear and tear, and this wear and tear, as mentioned elsewhere will tend to make the meter slow—by stretching the leather diaphragms; holes in diaphragms; leaking valves, etc., and the registration will be to the disadvantage of the company and in favor of the consumer.

In these cases, the defective meter, when discovered, is removed and replaced by one in good order. The result of such change is usually very unsatisfactory to the consumer who has for months, and perhaps for longer periods, been paying only for a portion of the gas consumed, and it is nearly always difficult to convince him of the equity of the case.

In the reading of meters it unfortunately sometimes happens that the gas company employee either underreads or overreads. Should he misread, either way, run to higher figures, showing a suspiciously large increase or decrease in consumption, the error is usually caught by the bookkeeper and a re-read ordered, when the mistake, if any, is rectified before the bill is presented to the consumer. In smaller amounts the error is not so easily detected and the consumer is seldom convinced when he complains of a bona fide high bill, that even had the mistake escaped his own (watchful?) care, that the matter would have adjusted itself at the next reading when a correspondingly smaller bill would be presented, or that it may have been due to an underread with a necessarily small bill for the previous month. Why the index of the gas meter is such a stumbling block to the average consumer is a matter of astonishment, since with few minutes' attention a knowledge of it may be acquired and its supposed mysteries solved. This same consumer in the purchase of other commodities would probably satisfy himself of the correctness of the measured or weighed article—at least this would be true if he were at all suspicious—and in all fairness to himself as well as to the gas company, it is his duty to check and verify the gas bills as he would other goods or invoices.

Purity of Gas

By the foregoing it may be remarked that the meter indicates the quantity or volume of gas measured, but has no reference to the quality, and the latter is of very important consideration in that domestic gas should be free from impurities. Gas may be of good heating value, yet so contaminated with impurities as to be unbearable.

Artificial gas as it leaves the generators is generally unfit for domestic use. It is more or less heavily charged with harmful ingredients which must be removed as prescribed by law. Impure gas benefits no one, and is alike harmful to the gas company and the gas consumer. It brings discredit to the company, prevents the full development of the gas business, and when unpurified gas is supplied—short of an accident to the purifying machinery—it occurs only through ignorance, or gross carelessness on the part of the company or its employees.

Impure gas in process of combustion causes a very disagreeable odor; it changes the colors of ornamental furniture, hangings and wall paper; it tarnishes plate; but over and above all, it is unwholesome, and gas companies have been known to suffer a material loss in business in consequence of its supply.

The ordinary harmful impurities in unpurified gas are few, and detection of them is very simple. All that is needed for the purpose are two small booklets of test papers, namely, turmeric and acetate of lead, both of which can be obtained from any drug store at trifling cost, and with which the gas company employee or the consumer can satisfy himself regarding their presence or absence. To detect the presence of ammonia, hold a leaflet of turmeric paper so that the gas can impinge upon it. Should it change in color from the original yellow to brown, it would indicate that the gas contained

ammonia, and the darker the color the greater the quantity. The second and much more pernicious impurity is sulphuretted hydrogen, which can be detected by a leaflet of acetate of lead applied in the same manner as the turmeric paper. Should the gas tested contain this impurity, the color of the leaflet will change from white to brown, and here again the deeper the color the larger the amount. The detection of the compound of carbon and sulphur is somewhat more complicated in that special laboratory equipment would be required, and since it is seldom present in injurious quantities, it will not receive attention here.

In addition to these so-called "major" impurities, which are now rigidly governed by law in every city of any consequence, all gas, be it artificial or natural, contains other so-called "minor" impurities, as oxygen, nitrogen and carbonic acid, which cannot be removed. They are detrimental to the extent that they contain no heat, but have not the harmful effects caused by the major impurities.

Many gas consumers imagine that a smoky gas flame arises from a dirty or unpurified gas, and it is sometimes hard to convince the lady of the house that this is not so. This is especially true when she can produce her smudged cooking utensils as prima facie evidence. The means of preventing smoke consist in having suitable burners, properly adjusted for the mixture of air with the gas, and the proper adjustments have not been obtained until the flame is clear, of a bluish color, and entirely free from smoke. Where the air shutter has been opened to maximum without bringing about this condition it would indicate that the gas orifice is too large for the burner and a smaller size orifice should be substituted, which can be done at trifling expense in most gas appliances.

On the other hand a burning gas free from smoke may be far from efficient on account of excess air which can usually be detected by the sputter or backfire of the flame. The remedy for this condition is obtained by curtailing the air supply or increasing the size of the gas orifice.

In my experience, correct adjustments have been condemned by the consumer; who themselves decreased the air supply, and for no other reason than that someone, somewhere, had said, the gas company favors a plentiful supply of excess air to the burners, with no other object in view than requiring the consumer to use more gas to heat the air.

Gas Fitting

Probably the next in line of complaint producers, in point of importance to the company and consumer, is inadequate and injudiciously arranged piping for the various uses of which gas is put. Nowhere in America has cheap, blundering, inadequate, gas fitting been as popular as in and around Los Angeles, in particular, and on this coast in general, in years past. This heritage of incompetence has been handed down to the gas companies, who, whether responsible or not, receive the blame from dissatisfied consumers for any and every diminished or interrupted gas supply. These consumers are almost always unfamiliar with pipe capacities, and cannot understand how their house lines can be trapped to prevent the gas from flowing or leaking, and allowing the gas to escape. The patience of the company's employees is sometimes sorely tried in their endeavor to point out the faults and convince the consumer of the necessity of alterations to correct the evils existing.

One of the most unsatisfactory, and sometimes dangerous, methods of conveying gas, is by means of flexible tubing. This is especially true of rubber or fabric hose, where the destructive action of the gas tends to disintegrate the material, resulting in the escape of gas. As a means of transporting gas, no matter how short the distance, its use cannot be discouraged too strongly.

Metal hose is sometimes assumed to be as good as pipe, since it is constructed of the same material. However, this is entirely a wrong assumption for the reason that metal hose depends on rubber or some other inferior material, or on gingerbread construction to make it gas tight. Safety is sacrificed for flexibility, and this flexibility, as well as the ease and the low cost with which it is installed, appeals to the average gas consumer to such an extent that the dangers due escaping gas are not reckoned with. Practically all gas hose or tubing is attached to the house pipe or appliance by means of a rubber nipple and this alone is sufficient to condemn its use, since a slight inadvertent movement may disturb the connection, thereby causing a gas leak and the result will depend on circumstances. It may be only a gas odor detected in time, it may be a fire with loss of valuables, or it may be asphyxiation with loss of life.

Ventilation

Venting and ventilation, except where governed by law—and by the way, this regulation, where it is in force, is even at the present day far from complete—received little or no consideration, which in all likelihood was and is due to our semi-tropic climate, and since 85 per cent of the year is tropic and only 15 per cent "semi," the "semi" has been lost sight of in the contemplation of the "tropic," with the unhappy results of insalubrious conditions when the thermometer falls, and it becomes necessary to close doors and windows. About this time of the year the gas consumer bestirs himself, brings forth his unvented gas heater —California and the Coast generally have them literally by tens of thousands—and complaints begin to take on more of a variety—"the gas has an odor," "the walls of the room are damp," "the air is vitiated," "the gas causes headaches"—and it is only too true, the gas causes most of the trouble. Yet the gas user knows that the results would be infinitely worse if he allowed the products of combustion of oil, coal or wood to escape into the room; therefore, he ought to know that the evil compared to gas is only a matter of degree and make some small, but none the less necessary, provision for it.

One of the most simple and effective methods, easily applied and capable of being put into instant operation, in a house of any construction, in which venting or ventilation received no consideration, consists of two pieces of wood about an inch thick, three or four inches wide and just as long as the width of the window casings of the room to be ventilated. Raise the lower sash of two, preferably, but not necessarily opposite windows, lay one of the pieces of wood edgewise on the bottom of each of the two window casings, close the sash down snugly on the pieces of wood, and you will find an opening between upper and lower sashes where they meet in the center. The warm air in the room will establish a current to the outside by passing upward through this opening in one window and draw a supply of fresh air from the outside downward through the other. This arrangement is rainproof; fairly good ventilation without draught will be secured, and

the gas odor, dampness and headaches will disappear. Where only one window is available, as occurs so frequently in bathrooms, appreciable relief will be obtained by utilizing this one window in the manner explained, the ensuing draught drawing at least a partial supply of fresh air through the cracks and keyhole of the door.

Of course, this arrangement is only a makeshift and may answer the purpose to some extent, where only a small sized room heater is in use, but never under any circumstances should a bathroom be equipped with an unvented water heater. The latter requires large quantities of gas for limited periods, for the instantaneous heating of the water and the products of combustion, discharging into the room, soon renders the air unfit to support life. Many instances could be cited where sickness and death has been directly and unquestionably traced to the unvented gas appliance.

In a paper of this kind justice can hardly be done the subject—a book would be required—yet in the writer's mind there is no question that if the gas company employee and the gas consumer can approach each other along the lines mentioned, three-fourths of the ordinary complaints will be eliminated.

While this may be too much to expect in this day and age, yet there is every reason to believe that a great majority of the gas consuming public is willing to learn if the gas company employee has the necessary qualifications in point of knowledge, and the ability as well as the patience to present the matter for intelligent comprehension. However, a hundred years of experience have demonstrated thoroughly that the consumer, as a general rule, will not come to the gas company for an education along the lines pointed out, therefore, it is up to the gas company, in its own interests, as well as in the interest of the consumer, to go to the consumer, fully equipped to spread the gospel of gas information for a better mutual relationship and understanding.

This much will always be true, all complaints, whether justifiable or not, should receive immediate and painstaking attention. The fact that no cause for complaint exists cannot, does not, and will not, influence the mind of the consumer as long as he thinks he has reason for a complaint, and the gas company's employee's job—wherever he is referred to as such in this article, it is generally either directly or indirectly in connection with the order and complaint department—is not only to remedy actual causes, but to cure imaginary ones as well, even if necessary to go to unreasonable lengths in point of patience and care.

The greatest asset of any gas company consists not so much in up-to-the-minute production equipment, or in ample and perfected distribution facilities, or even in fancy office arrangements, as it does in the reliable information and help it gives its consumers through the order and complaint department. Herein lies the real secret of a truly successful gas business.

Methods Used by Various Firms to Successfully "Put Over" Their Sales

By ERNEST A. DENCH

(Copyright, December, 1919.)

It has been said that there is nothing in a name. But the person who originated the saying never had a sale in mind. These occasional merchandising events are as plentiful as strawberries in June, so the competition is exceedingly great. A sale should be "camouflaged" in such a way that it appears to be a new and unusual merchandising event.

The principal feature of a sale conducted by an appliance firm in Indianapolis, Ind., was the 10 per cent discount. But the average woman has no head for discounts, so it is advisable to make up bargains in plain figures. The firm invited all housewives to join their Ten-Off Party, in connection with which it was explained that ten cents is reduced from every dollar spent.

Another Indianapolis store, Whitman's, handled the same situation by keeping the original price tag on the article. To arrive at the saving effected, all the customer had to do was pay half the price indicated.

Kraus Brothers, of Kansas City, Mo., inserted the cut of a traffic policeman ordering the traffic to move. This served to make clear what was meant by the "GO" sale.

The Famous Store, of Norfolk, Va., improved upon the Chain Drug Store penny sale by introducing their nine cent sale. Elaborate explanations were necessary in order to avoid misunderstandings, so the public was offered:

"Every third article of the same kind for nine cents. Every third dollar, nine cents. For instance, you pick your own bargains. You select a $24 article. Should you purchase three articles you get the third one for only nine cents. Should you only purchase one article you make every third dollar nine cents, which would make the $24 article cost you only $16.72."

The elasticity described in the foregoing sales conducted appeals equally well to the small or large purchaser—a feature that is conspicuous by its absence from the majority of penny sales.

The Rosebaum Company, of Pittsburgh, Pa., confine sales to one day only, which is christened Arco Day—"A glowing example of what we mean by value giving."

The Star Store, in Indianapolis, Ind., takes several columns of space in the newspapers. Each announcement comprises no fewer than thirty-six boxed-in, one-inch advertisements, with descriptions of the merchandise offered. At the top appears the title: "Our White Bargain Squares."

Strawbridge & Clothier, of Wilmington, Del., hold Double Clover Days, on which occasions the bargain counters in the store are indicated by four-leaf clover signs. The newspaper advertisements are also freely sprinkled with four-leaf clovers.

The Shepard Company, of Providence, R. I., use Red Price Signs as guides to their "Reconstruction" sales.

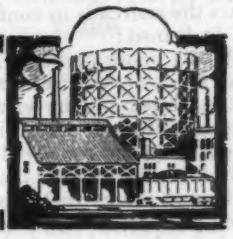
The A. L. Foster Company, of Hartford, Conn., take particular pains to impress upon the public the bargains obtained there. Unless this is done the fickle public is apt to take things too much for granted. This company stipulates that: "No articles are sold at bargain day prices unless they are mentioned when purchasing." "Articles advertised—for sale with coupons—will NOT be sold unless you present the coupon." "Exchanges will be made on all specials, but no money will be granted."

As the foregoing merchants have found it worth while to cleverly camouflage the sale, you will find it worth while also.

Gas Wells' Flow Increased 11,000,000 Ft. Daily

The Philadelphia Company's gas well in Dodge county, W. Va.,, which originally came in for 5,000,000 cu. ft. of gas a day, has been drilled deeper and is now making 16,000,000 cu. ft. daily.

NEWS OF THE GAS INDUSTRY



Atlanta Gas Light Company Exhibits By-Products at Fair

Widespread interest among new prospective customers for the by-products of the Atlanta Gas Light Company was created by the display of those products at the recent Southeastern Fair in Atlanta. Thousands of people inspected the exhibits in the Agasco booth, learning for the first time that so many useful by-products are obtained from the manufacture of gas. In this sense the exhibit was broadly educational. Also, its advertising value in the commercial aspect has been evidenced by a number of new inquiries the company has since received. The display was arranged under the supervision of James Ferrier, chemist and by-products salesman at the works of the gas company.

Two Chattanooga Companies Competing for Industrial Gas Business

Since the injunction granted to the Chattanooga Gas Company preventing the Chattanooga Gas & Coke Company, both of Chattanooga, Tenn., from selling gas to anyone except the Chattanooga Gas Company has been modified. General Manager J. H. Jones, of the Chattanooga Coke & Gas Company, announces that his company will enter into active competition with the Chattanooga Gas Company for the sale of gas to industrial consumers.

The Chattanooga Gas Company purchases 1,000,000 cu. ft. of gas per day from the other concern, whose daily capacity output is more than 2,000,000 cu. ft. Mr. Jones said that the entire surplus will be marketed in the industrial field as soon as facilities permit.

The Lookout Oil & Refining Company, of Alton Park, is already buying gas from the Chattanooga Coke & Gas Company. Six other corporations have applied for gas, and no trouble is anticipated in selling all that can be produced. No solicitation has, as yet, been done, Mr. Jones said.

Pipe for the various lines to be laid throughout the city of Chattanooga will be ordered immediately, but early shipment is held to be somewhat problematical on account of the steel strike. Within the next few months, however, it is promised that a system of pipes will be supplying gas in large quantities to many factories and other industrial establishments of Chattanooga using it in considerable amount.

Mr. Jones said that the industrial gas will no doubt be marketed at rates considerably lower than those now prevailing.

The general manager further asserted that his company had no intention of going into the "domestic" gas market.

Welsbach Patent Decision

Judge Augustus N. Hand, in the United States Circuit Court for the Southern District of New York, handed down a decision in the suit of the Welsbach Company vs. Jacob I. Robin, holding valid and infringed the Welsbach Company's United States patents No. 872,070 and 14,241.

In the opinion the court said: "The large commercial success of the Welsbach C. E-Z Lamp bears testimony to the novelty as well as the utility of complainant's device. I find no one in the prior art who solved or even fully realized the problem confronting the inventor."

An order of injunction and accounting is granted against the defendant, Jacob I. Robin.

Charlestown Company Asks Extension of Increased Rate

The Charlestown (Mass.) Gas & Electric Light Company has requested the Massachusetts Board of Gas and Electric Light Commissioners to extend or withdraw the recommendation made several months ago that the company reduce the price of gas to $1.05 per 1,000 ft.

Railroad Administration Seizes 13 Carloads of Coal Owned by Hartford Gas Company

Hours before the big coal strike went into effect, the Hartford City Gas Light Company was directly affected the day before the strike was declared when thirteen carloads of coal consigned to the company were confiscated by the United States Railroad Administration at the very moment they were about to be unloaded in the Hartford, Conn., yards. The seizure was made on orders of the superintendent of the New York, New Haven and Hartford Railroad Company in anticipation of a shortage on the railroad due to the strike that had not then actually started. Authority for the action was taken, he said, from orders issued by United States Fuel Administrator Harry A. Garfield.

Ernest E. Eysenbach, manager of the company, said that workmen of the company were all ready to unload the thirteen cars when a switch engine puffed up and hauled them away without ceremony. He immediately communicated with the superintendent of the railroad, who acknowledged that the action was the result of orders issued by him. The superintendent said the confiscation would probably be merely temporary, pending developments in the coal situation, but that the cargo would have to be held for the present to assure an adequate supply for the operation of trains. However, he said, the company would be "up against it" if the strike lasted many months.

The seizure of the thirteen carloads of coal left the Hartford City Gas Light Company with only enough coal to continue the production of gas two months longer, figuring an average consumption of 150 tons a day. The company has forty more carloads on the way to Hartford, but it may be taken over by the Railroad Administration before reaching the city.

Following is given the order which

allows the railroads to confiscate soft coal in transit:

"Acting under authority conferred upon me by the President of the United States and by virtue of authority conferred upon him by the act of Congress approved Aug. 10, 1917, I hereby revoke the order of the United States fuel administrator issued Jan. 31, 1919, in so far as it suspends the order of the United States fuel administrator of Jan. 14, 1918, active 7 o'clock a. m., Jan. 15, 1918, and the portion of the order of the United States fuel administrator of May 25, 1918, setting up preference lists and I hereby rest the said order of Jan. 14, 1918, and said portion of the order of May 25, 1918, to like effect as if they had not been suspended, and I designate the director general of railroads, and his representatives, to carry into effect the said order of Jan. 14, 1918, and to make such diversions of coal which the railroads under his directions may as common carriers have in their possession as may be necessary in the present emergency to provide for the requirements of the country in the order of priority set out in the preference list included in the order of the United States fuel administrator of May 25, 1918, as follows:

"'Railroads, army and navy, together with other departments of the Federal Government, State and county departments and institutions, public utilities, retail dealers, manufacturing plants on war industry, boards preference list, manufacturing plants not on war industry board preference list, jobbers, lake, tidewater. This order to be effective at once.'"

In conjunction with this order, the following letter has been received by E. J. Pearson, Federal manager of the New Haven road:

"Mr. E. J. Pearson, Federal Manager, N. Y., N. H. & H. R. R., New Haven, Conn.

"Having been informed of the issuance of the following order by the United States Fuel Administrator, the director general has issued instructions through the regional directors to place in effect immediately the provision of the order.

"WALKER D. HINES,
"Director General of Railroads."

THE PUBLIC SERVICE COMPANY of Northern Illinois says that in its territory sales of water heaters of both the automatic and storage types are far ahead of sales for the same period last year.

Central States Company Granted Rate Increases in Additional Cities

Higher rates for manufactured gas, supplied to Marion, Anderson, Elwood, Alexandria, Muncie, Hartford City and Fairmont, Ind., by the Central States Gas Company, are requested in a petition filed with the Indiana Public Service Commission by the gas company. The proposed net rates are $1.25 a 1,000 cu. ft. of gas for the first 5,000 cu. ft.; next 5,000 cu. ft., $1; and all over 10,000 cu. ft., 75 cents. It is proposed to establish a monthly minimum bill of $1.25 net. The proposed rates are to supplant rates expiring Dec. 1.

The company protests to the commission against a petition from the city of Muncie wherein the commission is requested to order the company to discontinue supplying industrial users in Muncie with natural gas. The company avers that it has natural gas sufficient in warm weather to serve both domestic and industrial patrons and that it does not wish to lose this business.

Among other reasons offered in support of the proposed higher rates the company avers that it will have to pay $13,000 more taxes next year than it did last year. The company says that its assessed valuation, as fixed by the State Board of Tax Commissioners, is $500,000 more than the tentative rate-making valuations estimated by the public service commission's engineers.

Questions Which Company Shall Pay Taxes

The State of Texas has in contemplation a tax suit against the Dallas Gas Company. The suit involves approximately $35,000 in back taxes, which the State probably will try to collect from the Dallas Gas Company. This matter is of vital interest if the suit is tried and a verdict in favor of the State rendered, as it will mean the reserve fund of the Dallas Gas Company will be impaired.

Lynn B. Milam, Supervisor of Public Utilities of the State of Texas, says that the Dallas Gas Company should not have to pay the taxes on gross consumption, as only a small percentage of the money derived from the sale of gas goes to the Dallas Gas Company, the Lone Star Gas Company getting the larger part of the gross proceeds under the existing contract with the Dallas company.

Advanced Rate Is Confirmed by State Commission

Notice was received last night by Mayor Sullivan, of Salem, Mass., that the Massachusetts Board of Gas and Electric Light commissioners, Alonzo R. Weed, chairman, has rendered a final decision setting the price that the Salem Gaslight Company may charge its customers at $1.40 net. The latest edict of the commission confirms the decision rendered some time ago, which was to the effect that the gas company was allowed to charge its customers $1.40 per 1,000 cu. ft. of gas.

The company in the summer petitioned to be allowed to increase its price 15 cents per 1,000. The comsion granted the petition, following a hearing in City Hall, when Alton D. Adams, gas expert, appeared in behalf of the city of Salem. After the decision Mayor Sullivan asked to have the case reopened and this was granted. A lively hearing was then held when Mr. Adams and City Solicitor Sullivan again took up the cudgels for the city. The commission took the case under consideration, but declined to make any change from its previous decision.

Commission Requires Report of Low Pressure

The State Corporation Commission of Kansas has issued a general order requiring all companies supplying or distributing natural gas for domestic consumption to make daily reports to the commission when gas pressure at any recording gauge is less than four ounces. The reports are to show the pressure at these low points for 24-hour periods. Gauges are to be maintained at regulation stations and any other points where they are necessary.

Ventura County Natural Gas Contains Highest B.t.u.

The Southern Counties Gas Company made a test of the natural gas served in the Ventura County district of California as to its heating value. The test showed that the gas in this district contains 1,286 B.t.u. Ordinarily natural gas as served elsewhere in the State of California and the East tests around 1,000 heat units, showing that the gas now in service in the Ventura district is richer in heating value by nearly 300 degrees than any other gas served in the United States.

Pennsylvania Public Service Commission on Readiness-to-Serve-Charge

In a report by the Pennsylvania Public Service Commission, rendered in the complaint of the boroughs of Sellersville and Perkasie, Pa., against the Highland Gas Company, Chairman Ainey says:

"It is a popular error to say that a readiness-to-serve charge requires consumers to pay for that which they do not receive. This is a wholly fallacious conception. Such charges are based upon the fact that the plant must be kept in a condition to render immediate service to each of its patrons whether he draws upon it or not. It costs the company money to be ready at all times to render such service."

The complaints were dismissed.

Judges Decision Revised in Higher Court — Company Wins

The United States Circuit Court of Appeals at Cincinnati, Ohio, where the case was ordered heard, reversed the decision of District Judge McCall, of Memphis, Tenn., in the injunction suit in connection with the price of gas brought by the Knoxville Gas Company against the city of Knoxville, Tenn., and the board of commissioners of that city.

Judge McCall denied the injunction sought by the company to prevent the city from interfering with the company's exaction of an increase in the price of gas, which increase was allowed and is in effect. The upper court sends the case back to the district court with the suggestion that the State Public Utilities Commission be permitted to regulate the price of gas.

The gas company contended that as a result of the increased cost of operating it could not maintain its service at the maximum of $1.10 per 1,000 cu. ft. fixed by the ordinance granting the franchise in 1903.

New Britain Company Announces Increase

The New Britain (Conn.) Gas Light Company has announced that the cost of producing and distributing gas has increased from 50 to 200 per cent., and that therefore its rates will be increased to $1.50 per 1,000 cu. ft., less 10 cents per 1,000 for prompt payment.

No Use for Old-Time Lamplighter

Spark Sent from Central Station Automatically Lights Street Lamps

The town crier has given way to the newspaper; the town constable has given way to the uniformed policeman, and now passes the last of the old town institutions, the town lamplighter. The department of lamps of the city of New Haven, Conn., is advertising for bids for a contractor who is not only willing to put in a large number of gas lights fitted with mantle burners, but who is also willing to keep the lamps cleaned and lighted.

And instead of the lamplighter, the new gas lamps will be lighted by a system of electric ignition by which at the throwing of a switch at the control office a spark in each lamp will ignite the gas whose flow is liberated by an electrically controlled pet-cock.

The contract calls for 1,415 incandescent or mantle lamps in which the burner used will be the 60-candle-power mantle burner consuming three feet of gas per hour.

"Carbosand" New Product of Quigley Company

The Quigley Furnace Specialties Company, Inc., New York, announce another new refractory product called "Carbosand," for making special shapes and tile, rammed-in linings, and for patching and repairing furnaces, gas retorts, flues, chambers and coke oven floors.

Carbosand is a highly refractory fire sand manufactured in an electric furnace by fusing at a high temperature a mixture of natural silica in its purest form and petroleum coke. It withstands temperatures exceeding 3,100 deg. Fahr., will not soften at temperature below point of breaking down, does not shrink or expand under temperature changes, is very dense, having a specific gravity of 2.2.

In linings there are many places where the standard or special shaped firebrick are not suitable for the purpose, or are difficult to secure. By mixing Carbosand with a suitable binder, special shapes can be made in a wooden or metal mould. Hot patching can be done by using a plastic mixture of Carbosand and Hytempite and forcing it into the break. This feature makes it particularly useful for hot repairs on retort linings, also superheaters in water gas plants.

Logan Natural Gas Company Abandons Service in 50 Cities

The Logan Natural Gas Company, one of the largest gas producing companies in the Middle West, has asked the State Utilities Commission to allow it to abandon its service in fifty towns and cities in the State of Ohio.

Statements that the State was facing a shortage of natural gas has been regarded by some as propaganda before this request was made by the Logan company. The company, in appealing to the State Commission, says that it is unable to buy or produce gas in quantities sufficient to furnish these Ohio communities.

Commissioner Asks That Company's Business in Two States Be Separated

Commissioner Barhite, of the New York State Public Service Commission, in connection with the rate hearing of the Pennsylvania Gas Company, in the city of Jamestown, N. Y., asks in a letter addressed to the company's attorneys that the business of the Pennsylvania Gas Company in New York State be separated from that of the State of Pennsylvania. He says there is not sufficient evidence in the case now on which to base a New York rate.

In a statement regarding the company's position, its attorneys stated that: "Commissioner Barhite's letter means that the complainants in the gas case have failed to prove a case against the company. Upon the hearings the company furnished voluntarily all the facts and figures requested by the commission or the complainants, even though they concerned the Pennsylvania business of the company as well as that conducted in New York. However, the company contended, as it has from the outset of the case, that the commission had no jurisdiction over the rate because the busines was interstate commerce and that the commission could not determine the New York rates based on any considerations of returns earned upon the Pennsylvania business or property of the company in New York State.

The company offered no evidence in rebuttal but moved to dismiss the proceedings on the ground that the burden of proof rested on the complainants and that they had failed to meet this burden.

Big Gas Meter Gain in Atlanta, Ga.

The Atlanta (Ga.) Gas Light Company reports that an extraordinary gain was made in October with 5-light gas meters, that being the size usually called for by the average family. L. M. Stricklin, foreman of the gas meter shop, reported an actual gain of 335 meters of this size and says that this is the biggest figure he has known in a number of years. There were smaller gains in other sizes of meters, and inconsiderable losses for the month in the remaining sizes; but the net result was a considerable gain at the end of October over the figures recorded for September 30.

Tom's River Company Granted Increase

The Ocean County Gas Company, of Tom's River, N. J., was granted an increase in rate by the State Board of Public Utility Commissioners on Nov. 12, 1919. The new rate is to take effect from Nov. 1, 1919. The new rate will be $1.70 per 1,000 cu. ft., less five cents discount on bills paid before the 10th of the month, plus a $3 per year fixed service charge per meter. The old rate was $1.55 per 1,000 less five cents discount.

Muncie, Ind., Factories Affected by Discontinuance Order

John McPhee, city attorney for Muncie, Ind., filed a petition with the Indiana Public Service Commission asking that an order be issued by the commission to prevent the Central Indiana Gas Company from supplying natural gas to manufacturers and other large consumers from November 10 to April 1 in order that Muncie householders may be assured of an ample supply when cold weather comes.

Muncie is wholly dependent on the Central Indiana Company for its gas supply, which is piped from the West Virginia field.

The United States Fuel Administration last winter entered an order against the gas companies requiring them to cut off supplies to industrial concerns, with the result that most of the towns along the Logan company's lines, which company supplies the Central Indiana Company, had plenty of gas for domestic purposes. The city authorities believe it more necessary that the natural gas be used only for domestic purposes next winter.

Nearly all Muncie factories will be affected to some extent by the cutting off of their gas supply, but all are equipped to substitute coal for gas when necessary.

Richmond Company's Rate Increase Granted

Announcement was made by the Indiana State Public Service Commission that the petition of the Richmond (Ind.) Light, Heat & Power Company, for an increase of the gas rate for Richmond, has been granted, effective from October 1, 1919.

According to the order made by the State Commission on the case, the Logan Natural Gas Company, from which the Richmond company receives its supply, increased its rate from 21 cents to 35 cents per 1,000 cu. ft., and this, with an increase in taxes, is given as the reason for increased rates.

The report further states that the commission had originally intended to allow an increase that would cover only the increase made by the Logan company, but they decided to concur with the opinion of the city council of Richmond, and allow for the increase in taxes of the Richmond company.

The new rate scale and the statement of the State Commission on the increase, which is included in the order follows:

	Rate	Discount	Net Rate
First 1,000	$.95	$.10	$.85
Next 1,000	.85	.10	.75
Next 1,000	.80	.10	.70
Next 1,000	.75	.10	.65
Next 1,000	.65	.10	.55
Next 5,000	.60	.10	.50
All over 10,000 feet	.45	net	.45
Minimum charge	.95	.10	.85

"The commission would be inclined to increase rates only to cover the increased cost of supply to the Richmond Light, Heat & Power Company, but for the fact that petitioner's taxes have been materially increased, that there is still an unmistakable upward trend of all operating costs and that the increase in rates may result in a decrease of consumption.

"The commission finds that an increase in rates will be necessary to meet the increased cost of gas and increased taxes, and to yield an adequate return on the value of the property, which is approximately $450,000."

Commission Approves 25 Per-Cent Rate Increase

The petition of the Huntington Light & Fuel Company of Huntington, Ind., for higher gas and steam heat rates has been approved by the public service commission. The increase is 25 per cent in the primary rate on gas and 50 per cent in the primary rate on steam heat. The new gas rate is $1.25 per 1,000 for the first 5,000 cu. ft., $1 a thousand for the next 5,000 cu. ft., and all over 10,000 ft., at the rate of 80 cents a 1,000. A minimum charge of 50 cents a month is established.

The commission tentatively valued the steam heating plant at $110,000 and the gas plant at $375,000.

New Haven Company Will Increase Street Lighting Contract $4.95 Per Lamp

The contract between the city of New Haven, Conn., and the New Haven Gas Light Company for furnishing gas lamps in the streets of the city of New Haven expires with the end of the current year. With the renewal of the contract the new street lighting contract will be figured at the rate of $25.35 a year for each street gas lamp, which is $4.95 cents per light more than is provided for in the existing contract. The aggregate increase in cost to the city of New Haven will amount to something like $7,000 a year.

Officers of the New Haven Gas Light Company appeared before the New Haven committee on street lighting and told the members of the committee why the company had to make this increased charge. They point out the higher cost of labor and coal, and all other commodities and materials used by the company in manufacturing its product and in the upkeep of its great plant.

Jantha Company Asks Increase

Raise of rates for natural gas in Eaton, Ohio, is being sought by the Jantha Light & Fuel Company, which company operates in that city.

The present local minimum rate is 45 cents a 1,000. The Jantha company is a patron of the Logan Gas Company, which obtains its gas supply from the West Virginia fields, which company has increased its rates to the Jantha company.

Republic Company Petitions $1 Rate

The Republic Light, Heat & Power Company, successors to the Ontario Gas Company, has filed with the New York Public Service Commission a petition to charge $1 per 1,000 ft. for gas. The territory affected includes part of the towns of Bristol, West Bloomfield, East Bloomfield, Lima and Mendon and the villages of Honeoye Falls, Lima, East Bloomfield and Holcomb, N. Y. The present price per 1,000 cu. ft. charged by the company is 35 cents.

P. S. C. Orders Hope Company to Furnish Gas Under Steptoe Act

An order has been entered by the Public Service Commission of West Virginia directing the Hope Natural Gas Company to sell to the West Virginia Traction & Electric Company, a gas distributing company, of Morgantown, W. Va., approximately 250,000,000 cu. ft. of natural gas at the temporary rate of 23 cents a 1,000 cu. ft. between the dates of Dec. 1, 1919, and Aug. 31, 1920.

This is the first case dealt with by the commission following the passage of the Steptoe bill by the West Virginia legislature, which directs that West Virginia consumers be furnished gas in preference to other States. It was brought before the commission upon the complaint of the city of Morgantown and others.

The commission dismissed the complainant's petitions against the Randall Gas Company on the ground that this company can by curtailing the supply of its industrial consumers supply the demands of its consumers.

The commission directs the West Virginia Traction & Electric Company and the Hope Natural Gas Company to make physical connection of their lines and mains not later than November 25, the expenses of the connection to be borne by the former.

Judge E. F. Morgan, member of the commission, did not concur in the provisions of the order fixing the price, regarding it as excessive and unreasonable.

Supply Cut Off in Elmira

Gas may not be used in furnaces capable of burning coal in Elmira, N. Y., according to a resolution of the Second District Public Service Commission. It has instructed fifty natural gas companies to conserve their outputs.

Brockton Company Asks Consumers to Consider Fairly Its Needed Increase

The Brockton (Mass.) Gas Light Company announced an increase in price of 10 cents per 1,000 ft. to its patrons in the towns it serves. The notice sent to consumers stated that the increase is made necessary by the actual cost of distributing gas. It adds, that in view of the fact that the stockholders of this company have received no dividends on their investment since Jan. 1, 1918, and that there is no immediate prospect of a declaration of any such dividend, the company requests its patrons to consider the situation fairly, and to recognize that the increase hereby notified is not only just, but absolutely necessary.

Personal Notes

William P. Adams Appointed Sales Manager of New Merchandising Dept.

The High Pressure Construction & Supply Company, of Millville, N. J., has opened a merchandising department, selling appliances for the territory covered by the Cumberland County Gas Company, Millville Water Company, and Millville Electric Light Company. William P. Adams, secretary-treasurer of the New Jersey State Gas Association, has been selected as sales manager for the new department. The main showroom will be located at 207 High Street, Millville, N. J., with branch showrooms at Vineland, Port Norris and Cedarville, N. J.

Clifton R. Hayes Appointed Engineer Manager of Tenney Co.

Clifton R. Hayes, for eleven years manager of the Fitchburg Gas & Electric Light Company, of Fitchburg, Mass., has been transferred to be engineering manager of the Charles H. Tenney Company of Boston. Mr. Hayes will assume his new duties immediately and he will then have charge of the engineering department in all the properties which are managed by the Tenney syndicate. Mr. Hayes's successor in the Fitchburg company has not yet been made public.

Mr. Hayes is a native of Fitchburg, a son of Mr. and Mrs. Wylon G. Hayes. He was graduated from Fitchburg High School in 1897, attended Worcester Polytechnic Institute and spent one and a half years on the Worcester Consolidated Company and five years with the Ludlow Manufacturing Association of Ludlow. He came back to Fitchburg in 1908 as superintendent of the electrical department. He was made manager of the Fitchburg Gas & Electric Company when it was taken over by the Tenney company in 1909.

Directors of Omaha Company Honor Memory of the Late Frank Hamilton

Resolutions in memory of the late Frank T. Hamilton were adopted at the regular monthly meeting of the board of directors of the Omaha (Nebr.) Gas Company. Mr. Hamilton was president of the company.

The resolutions are as follow:

"Resolved, That in the death of Frank T. Hamilton this company, as well as the city, has met with an irreparable loss, and, be it further

"Resolved, That we tender to his family and surviving relatives of the deceased our deepest sympathy and commend them to the consolation to be found in the record of a most useful honorable life.

"Resolved, That copies of these resolutions be furnished to the family of our deceased president and that a copy be placed upon the records of this company."

Mr. Hamilton became identified with the Omaha Gas Company Jan. 23, 1905. He was made president after the death of his uncle, Frank Murphy, who died in New York, Dec. 12, 1904. His interest in the employees of the company was most marked.

John B. Anderson Resigns as Assistant Manager of Brockton Company

John B. Anderson, assistant manager of the Brockton Gas Light Company, Brockton, Mass., has tendered his resignation to General Manager George H. Priest to become effective Dec. 1. Mr. Anderson has planned to open a store in Worcester, Mass., dealing in general gas appliances and supplies.

Mr. Anderson assumed the duties of assistant manager of the Brockton Gas Light Company in September,

1916, succeeding Joseph S. String, who resigned on account of ill health. Prior to this he was for ten years with Stone & Webster. He is a native of Pennsylvania and a graduate of Pratt Institute, Brooklyn, N. Y.

Clifford E. Paige Chosen Manager of Worcester Company

Clifford E. Paige, considered one of the best gas engineers in New England, was chosen manager of the Worcester Gas Light Company at a special meeting of the board of directors and immediately thereafter he assumed his duties with the Worcester Company.

Mr. Paige has for five years been manager of the Malden & Melrose Gas Light Company. For a week or two he will have to spend a part of his time in Malden, looking after certain details connected with his management of the Malden & Melrose Gas Light Company, but from the beginning most of his energies will be devoted to the Worcester company. He will have complete charge of operating the gas plant, the distributing system and the gas appliance end of the business.

Mr. Paige is thirty-five years old. He has devoted his life since early manhood to the gas business. On leaving Wilbraham Academy, Springfield, Mass., he entered the employ of the Springfield Gas Light Company, starting in the office at the bottom. That was in 1903, and in 1905, when the company passed under the management of Charles H. Tenney & Co., Mr. Paige had become the assistant superintendent.

In that year he was transferred to another Tenney property, the Malden & Melrose Gas Light Company, as superintendent.

Construction Notes

Big Gas Boiler Put in Candy Factory

The first gas steam boiler to be applied in Atlanta, Gas., to the manufacture of candy in quantities was installed recently by the Atlanta Gas Light Company for the Reese Candy Company, by purchasing a 10-hp. equipment. Only two others of this size are in service in Atlanta, one being used by Swift & Co. for making sausage, and the other being in the ice cream factory of George P. Moore.

Providence Company Opens New Meter Station

After several weeks of construction work, the Providence (R. I.) Gas Company has officially opened a new meter repair, gas installation and distribution center in Olneyville, R. I.

The new department is in a building formerly owned and operated as a garage. Two three-story tenement houses adjoining the property have been secured by the company and a passageway from the garage to the first and second house made from the second floor of the former. The floor space which the company now has in Olneyville for the carrying on of its work is much larger than that previously used by them.

After the garage was secured, extensive alterations were made, and then the adjoining houses were purchased and the partitions torn down for the transformation from tenement rooms to a large supply house and stock room.

Now that the entire Olneyville, R. I., plant is completed the company has one of the finest repair stations to be found in New England. The first floor of the garage is being used for the autos and trucks of the department and the second floor for a meter repair station. This floor has been planned to afford considerable room for a reasonable growth. The first house has a stock room on the first floor which will contain all sizes of couplings, nuts, bolts, joints, piping, elbows, and practically all the necessary parts for the repair department.

The distribution department will be located in the second house acquired in the purchase. The executive offices of the Providence Gas Company will be located here.

$74,450 Building Permits Taken Out by Modesto Company

The Modesto (Cal.) Gas Company, by its president, Frank A. Cressey, Jr., has taken out permits for the construction of $74,450 worth of new improvements as follows: Gas building, $2,000; gas holder, $27,000; boiler and accessories, $7,750; gas generator, $9,000; purification apparatus, $6,000; accessory equipment, $1,700, and water plant, $1,000.

The work is now under way.

U. G. I. Contracting Company Awarded Many New Contracts

The U. G. I. Contracting Company has lately been awarded a contract from the International Coal Products Corporation, through Ford, Bacon & Davis, engineers, for two sets of U. G. I. Blue Gas Apparatus, to be installed at Clinchfield, Va.

At Lawrence, Mass., the company is installing a carbureted water gas apparatus with an approximate daily capacity of 2,000,000 cu. ft., and at Syracuse, N. Y., it is installing the same apparatus with an approximate daily capacity of 3,500,000 cu. ft.

Other contracts awarded to the U. G. I. Contracting Company include a hydraulically operated set to be installed for the Lynchburg (Va.) Traction & Light Company.

The U. G. I. reports that it is engaged in a large amount of remodeling work for gas companies in various parts of the country.

Northern Alabama Company Will Enlarge Florence Plant

The Northern Alabama Gas Company announces that at an early date it will enlarge and modernize in every particular the plant it operates at Florence, Ala. C. B. Kelsey and Claud Hamilton, capitalists of Grand Rapids, Mich., who are interested in the company's Florence plant are making investigations.

Improvements at Madera Company of California

Improvements on a considerable scale have been begun at the plant of the Madera Gas Company, of Madera, Cal. A new generator is being built to replace the one burned out some time since. It will be larger and better than the former one which it replaces.

Another improvement will be the installation of an automatic time switch, which will keep the gas pressure up to a high notch until 12 o'clock at night, or even later if the service warrants. Also it will turn the full pressure off at 5 o'clock in the morning. At present the high pressure goes off at 8 p. m.

G. W. Kitchen, president of the company, states that there is a continual increase in the number of users of gas. During the past eight months more than 100 new connections have been made for domestic use.